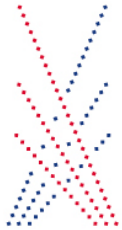

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# Leadership and Strategic Management Effectiveness during Crisis in the Construction Sector: A case study.


## Abstract

This research explores the importance of critical success factors for effective project management under a crisis condition and investigates crisis management practices within the construction sector. The case study of the Greek construction sector is examined through an empirical study and distribution of a questionnaire to a sample of 154 managers and engineers in construction companies applying decsriptive and inferential statistics for data analysis. Forming a set of 6 factors labeled as "Organization and Human Resources", "Project realization issues", "Organizational bond and technology background", "Planning/organizing issues", "General environment" and "Project features, the study concludes that the most important skill for a crisis situation is the managerial one. The study recommends the importance of integration of a crisis management policy in an operation level in order management and leadership effectiveness to be enhanced.



**Keywords:** construction, management, leadership, effectiveness, project, crisis

# Introduction

## 1.1 Background

A company's performance and availability to survive in severe crisis situations is strongly related to management and leadership effectiveness (Iyer et al. 2005, Enshassi et al. 2009). Furthermore management and leadership effectiveness are closely related and defined by a number of factors such as personal characteristic and skills of the leader or manager like communication skills, honesty, trust, flexibility, initiative etc (Maxwell, J., 1998) and a multi frame of organizational, human resource and political factors (Bolman & Deal 2008, Chang, 2004). Existing studies also reveal that management effectiveness has been seriously influenced by the economic recession especially in the European construction sector (Paul Tansey et al. 2013).

## 1.2 Research Objective

Many studies have been conducted on issues of management effectiveness in different industries (Huvary 2006, Cooke Davies 2002). A significant number of them focuses on management issues in the construction sector (Chan et al. 2013, Ofori 2013, Norizam et al. 2013) , while others investigate the part of risk management in terms of strategies and risk techniques used by construction companies (Bakar, A. et al. 2011). However little has been written about construction managers' effectiveness under crisis situations. This study examinining the case of Greek financial crisis, tries to investigate the degree up to which crisis has affected the importance of enviromental, organizational, human resource and project factors that influence managers' and leaders' performance. The Greek construction companies have been facing with serious decline in the number of ongoing projects and major losses in profit rates due to large drop in value added prices. It is also worth to be noted that employment in the sector started shrinking since 2007 and reaches historically lowest rates since 2011(Greek Association of Technical Companies 2012, Semiannual Report A' 2012, Issue 7). Project management and leadership issues had to be redefined in order to comply with the current extremely difficult economic circumstances.

The aim of this research is to identify the factors that influence leadership and management effectiveness in the construction sector, under the conditions of the

Greek economic recession. More specifically this study examines the importance of factors that contribute to the performance of construction managers and aims at identifying the special skills and features required for an ideal leader in circumstances of economic crisis. Furthermore an attempt is being made to monitor the familiarity of the construction industry regarding management tools and the perceptions about actions that need to be taken to cope with the problem of "crisis" manage to survive.

### 1.3 Research contribution

Construction industry is characterized by complexity in its nature, not only because of the many parties involved, such as clients, subcontractors, consultants, stakeholders, engineers and foremen, but of the complex nature of the project itself as well. Construction projects in Greece suffer from many problems that mainly have to do with coordination and administration issues. The appearance of crisis, within this special complex framework, made things even more crucial and project managers/leaders were challenged to play the most important role and perform the best.

Previous studies about Greek construction industry and crisis, deal with a number of aspects concerning these two constructs (Eriotis et al. 2013, Skordoulis et al. 2014). However, none of them has put under the scope of investigation the influence of crisis on management effectiveness issues. Therefore, this research attempts to define and evaluate the factors affecting the performance of construction project managers/leaders under crisis conditions, using as a case study the Greek financial recession, in order to assist people involved in the industry to comprehend and overcome negative impacts of the crisis on management performance and make all necessary improvements.

## 2. Project management and leadership effectiveness

### 2.1 Management

A project, as defined by Wysocki et al. (2000), is a sequence of unique, complex, and connected activities having one goal or purpose that must be completed by a specific time, within budget and according to specification. Gemunden, Salomo & Krieger (2005) define project success along the dimension of triple constraints (time, budget,

and quality), the internal success dimension (technical success, competency gains etc) and external success dimension (financial success, meeting the market shares, image gain etc). The role of project manager is critical for the success of a project. For example, based on a study on large construction projects in Vietnam (Nguyen, Ogunlana, & Lan, 2004), a study from the Indian construction industry (Iyer & Jha, 2006), and a third study on multiple public and private firms in multiple industries (Mishra, Dangayach, & Mittal, 2011) the top factor for success of a project is the competency of the project manager.

Many definitions have been given by hundreds of authors for the role of project manager. House and Aditya (1997) defined management as the behaviour of a person in a position of formal authority, intended to obtain compliance of organizational members with their normal role or position requirements. Baker (1997) stated that purpose of management is to stabilize the orientation of the organization by maintaining successful patterns of action through the development and control of standard operating procedures.

According to Chatfield (2007) project management is the discipline of planning, organizing and managing resources to bring about the successful completion of specific project goals and objectives. It is the application of knowledge tools and techniques to project activities in order to meet or exceed stakeholders' needs and expectations from a project. Meeting or exceeding these needs and expectations invariably involves balancing competing demands among scope, time, cost & quality, stakeholders with different needs and expectations, identified requirements and unidentified expectations. (PMBOK 1996; Windeman 2002). According to Kumaraswamy and Thorpe (1996), project success is not synonymous with effective project management. Windeman (2002) mentions that project management effectiveness is a measure of the quality of attainment in meeting objectives

## 2.4 Managers & leaders in the construction industry

Success of project management is not merely embedded in the Project Management (PM) skills set, as stipulated in various PM competency frameworks, but also in the informal system of motivation and empowerment (Chan et al., 2004). A construction project requires management and the effective manager exhibits good leadership. (Gharehbaghi and McManus, 2003). The manager's ability to influence the speed,

quality, and cost of the project places the project's success or failure squarely on their leadership skills (Odusami, 2000). For the purposes of this study the leadership behaviour of project managers will be examined, as it has been referred to as a very essential skill within the managerial position by many authors (Odusami, 2000; Gharehbaghi and McManus, 2003).

## 2.5 Factors that influence management effectiveness in construction projects

A lot of research has been conducted about factors that can influence the effectiveness of a manager and the performance a construction project(e.g Iyer & Jha 2006, Irja H. 2006, Ekung et al.2014). According to Cooke & Davies (2002), success factor are those factors entered into the management systems and result in project success directly or indirectly The critical factors of management effectiveness, that constantly show up from relevant studies, regard mainly to the areas of projects' characteristics, manager's skills and competences, human resources, organizational structure and environment conditions.

Chan et al. (2004) distinguished five critical success factor groups from 44 identified factors-items in the construction industry. These were human related factors (e.g. personal characteristics of the project team leaders such as technical, planning and organizational skills, the size and nature of the client), project related factors (e.g. type, size, complexity and nature of the project), projects procedures (e.g. procurement method), project management actions (e.g. communication system, control mechanism, implementation of an effective safety program ), and external environment (e.g. industrial relations, economic, social and physical environment).

Iyer and Jha (2006), in a survey conducted among Indian construction projects, in order to examine the reasons of poor quality performance, identified that project manager's competence, coordination and leadership skills are among the most important factors that influence project cost performance.

Li (2005) identified 55 attributes and grouped them into five Ctitical Success Factots (CSFs) for public-private partnership projects in the United Kingdom. Those five

categories were: effective procurement, project implementation ability, government guarantees, favorable economic conditions and the available financial market.

Muhammad Saqib et al. (2008), using 77 identified factors that influence Pakistan's construction industry, managed to develop a number of top critical success factor groups: contractor-related factors, project management factors, procurement-related factors, design team-related factors.

In a survey carried out among Germany's largest construction companies by a consultant company (Ronald Berger Strategy Consultants, 2004), the most important identified success factors were employee development, effective risk management, innovation, partnerships with customers and lean organizational structure.

Rafooqui R. (2008) conducted a research in order to identify the most important skills of effective project managers as perceived by the major stakeholders in the Pakistani construction industry. Time management was recognized by all industry agents as the most important project management skill. Furthermore, decision making, communication, leadership and motivation were identified as the top five skills. Financial management, risk taking, and ability to follow up were put at the bottom of the ranking. In the same study, he also tried to investigate the relative difference in the importance of skills of an effective project manager in relation to level of complexity of projects. In high level complexity construction projects creativity communication, organizing and technical knowledge were noted as the most important skills while ability to follow up, financial management and negotiation were the least important.

Irja Hyväri (2006) undertook a relevant cross industry study aiming in the comparison of the rankings of factors with the results of previous surveys. Among other interesting conclusions that rose from her research, the results showed a number of very important factors for effective project management, grouped to the following categories: Project related factors (clear goals/objectives, end-user commitment and adequate funds), Project management related factors (commitment, ability to coordinate and effective leadership), Project team related factors (communication, commitment and technical background), Organization related factors (top management support, clear job description, project organization structure), Project environment related factors (client, technological environment and economic environment).

From late 80's (Pinto & Slevin, 1988) until most recent years (Cooke-Davies 2001, Cleland & Gareis, 2006) researchers have concluded to a set of very important factors for project management such as project mission, top management support, project schedule/ plans, client consultation, personnel, availability of required technology , client acceptance, monitoring and feedback, communication and trouble shooting.

Frese and Sauter (2003) argued that, generally, good planning, clear responsibility and accountability, schedule control as well as project leadership, governance and communication are key areas of successful projects. Khang and Moe (2008) expanded the previous work by recommending a set of critical success factors for each phases of the project life cycle.

Love and Irani (2004) found that for small and medium size enterprises (SMEs) within the construction industry, the key of competitiveness relies on the role of the manager, investments in intellectual capital, investments in information and communication technology, and the ability to adapt to change.

Alnaseri et al. (2013), explored the relationship between organizational culture, authentic leadership style and effectiveness within the context of a case study investigation of Middle Eastern construction clients and their project managers. The study revealed that organizational culture is directly and positively related to performance and effectiveness, while project managers' leadership style has an indirect relationship to effectiveness.

Barry (2000), proposed ten qualities that make a manager effective. These qualities include inspiring a shared vision, good communicating skills, enthusiasm, team building skills, problem solving skills, ability to delegate tasks among subordinates empathy and competence under pressure.

Mohamed (2014), identified and presented the effect of leadership in construction productivity improvement. He suggested that the construction manager must act as a leader throughout the life of construction project. By using leadership tools he could affect productivity improvement through good understanding for employees' needs, good communication skills with employees and workers, and good judgment for different situations to take the correct decision. Mohamed also concluded that a construction manager as a leader must assess the situation and match the appropriate leadership to the situation and tasks at hand.

Toor and Ogunlana (2008) and Arslan et al. (2008) in their research, focused on critical success factors of construction companies as a whole. Toor and Ogunlana identified relationships with stakeholders as being key, while Arslan took a much broader view and determined critical success factors in an empirical analysis of 40 Turkish construction firms, namely business management, financial conditions, and owner/manager characteristics.

Rahele Nourifar (2006) did a research entitled "Identifying the critical success factors of Iranian project managers - case study" and tried to monitor the perception of experienced people active in the field of project management in Iran. "Realistic schedule", "Appropriate and adequate resources and budget allocations" and "Clear project objectives" were considered the three top critical success factors.

Arslan & Kirvak (2008), identified as critical factors manager's characteristics and financial conditions, among others, as the most important factors. Furthermore experience, communication and leadership skills were found to be highly essential characteristics of managers/owners.

Norizam & Malek (2013), tried to identify the principal CSFs for construction management. From the literature review, seven main factors were chosen from all of the sub-factors discovered. Each group of factors was ranked according to their means values. They concluded to the following top CSF: Construction Plan Development, Scope Definition, Activity Definition, Cost Control, Staff Acquisition and Risk Identification

Ofori (2013), tried to identify and assess the quality of project management practices as well as the critical success factors for projects in Ghana. Results from the study indicated that the critical factors are top management support, effective communication, clarity of project purpose and goals, stakeholder involvement, coordination and commitment, effective planning, experienced and competent project personnel, teamwork and good leadership. The study also indicated that attention must be paid to the 4Cs –communication, commitment, competency, and coordination.

Fortune and White (2006) reviewed 63 publications that focus on critical success factors (CSF) and listed the three most cited factors as the importance of a project receiving support from senior management, having clear and realistic objectives and producing an efficient plan.

## 2.6 Critical characteristics and skills of effective leadership

Leadership in construction projects has been the subject of many researchers and scientists. Theory says that the distinct characteristics of an effective leader have mainly to do with giving motive and being influential, inspirational and supportive to the members of his team. However, going through a number of previous studies, among the required characteristics of a leader in construction projects in order for him to be effective, many of them are actually managerial.

Ekung & Ujene (2014), assessed the leadership traits of construction project managers and its impact on project delivery in Nigeria. The study identified effective communication, accessibility, intelligence and competence among others as the most important leadership traits. Mohamed (2014), suggested that the construction manager should use leadership tools in order to affect productivity improvement through good understanding of the employees' needs, good communication skills with workers, and good judgment for making correct decision in various expected and unexpected situations.

Alsadey et al, (2011) attempted to identify the personal and professional needs of project leaders in the construction industry in Libya. From the search the factors "concise and rational" were ranked as the first personnel factors, while "versatile" was considered the most important professional factor.

Hyvari (2006), in her research concluded that planning/organizing, networking and informing are the most important managerial practices in the leadership behavior of a project manager. Rimualdo (2003), proposes that knowledge ability to stimulate interest and delivery of quality results are factors used to distinguish between leadership and management. He explains further that a project manager must have the knowledge to show enthusiasm and convey to the staff important information and also be able to organize the methods that follow systematically. This will make him/her an effective leader. Furthermore, an effective leader should be able to bring out the interest of people to deliver quality results.

Odusami (2002) conducted a questionnaire regarding the most important skill of an effective project manager as perceived from the construction field. In this study, leadership and motivation was ranked as the most important skill followed by decision making from consultants' point of view. Contractors found communication

as the most important skill and clients said that decision making was number one. In the overall analysis, decision making was found as the most important skill and negotiating the least important skill.

Adrain (2004) explained that leadership skills such as planning, flexibility, team building, seeking the opinion and knowledge of participants, having a strong vision and being a problem solver could enhance the implementation of a successful construction productivity improvement program.

Gharehbaghi and Mcmanus (2003) stated that good leadership in constructions isa result of the effective use and implementation of certain skills such as understanding the needs and characteristics of the position, knowing and using of the resources correctly, effective communication, planning and controlling team performance. George, (2003) and Toor & Ofori, (2008) supported that authentic leaders have unique characteristic and traits, which include morality and self-discipline, personal integrity, positive energy, transparency, confidence, clear purpose. This enables them to lead with concern about others and to establish connected relationships. According to Bhangale & Devalkar (2013), communication, confidence and decision making are three most important leadership skills of construction project management.

Xiong R., (2008) conducted a survey about the importance and key role of leadership in project management. In his question about important leadership skills the respondents included communication; planning; knowing and using the resources of the group; understanding the needs and characteristics of the post; and controlling group performance.

The Managerial Practices Survey (MPS) is a method, frequently used by researchers, in order to measure leadership behaviours of project managers. The method consists of a questionnaire in which 14 behaviour categories are presented. MPS measures categories of managerial behaviour that are relevant to managerial effectiveness and are applicable to all types of managers. The 14 behaviour categories are related to the four general types of activities such as decision making, influencing people, building relationships and giving-seeking information. The 14 behavioural categories are planning/organizing, problem solving, monitoring, networking, informing, clarifying, motivating/inspiring, conflict management/team building, supporting, consulting, recognizing, developing, rewarding, delegating.

Based on the MPS and having in mind the findings of previous studies, most cited leadership skills were used for the purposes of this study, in order to evaluate leadership behaviour, in terms of performance, under the current financial uncertainty and to identify the ideal skills that a construction leader should have. Taking under consideration the fact that the questionnaire addresses to Greek professionals, certain changes were made in order for it to be more comprehensive and suitable. Some traits were grouped together, some others were rephrased and some new ones, considering the needs of the ongoing situation in the Greek construction sector, were introduced directly from the researcher.

## 2.7 Crisis and construction management

Financial crisis is a particularly unpleasant situation where the economic conditions and the lack of liquidity in the market hinders the smooth realization of financial transactions and hence the productivity of companies.

Fink S. (1986.) and Heath R. (1998) describe crisis as a period of sudden change during which a totally new system is formed. Within these conditions of change, where risk, uncertainty, threat, conflict, accident and instability dominate, they stress the fact that opportunity also underlies.

During an economic downfall, resources are limited due to declining purchasing power, funding from financiers is tight and competition rises. Usually, in almost every sector, companies in order to survive, move quickly to reduction of the employees, changes in their structure and their way of functioning and reductions in costs, expenditures and debts.

According to Tansey's et al. (2013), the majority of construction companies adopt differentiation strategies in order to survive an economic recession, with cost leadership strategies being mostly used in the 2007 recession. Management style, market penetration, quality improvement, market development and product development were among the top survival strategy adopted by Malaysian construction companies during the past two economic downturns the country faced. (Bakar et al. 2011, Pung et al. (2014), in their research study, asked senior managers in private Vietnamese enterprises what they saw as priorities in the recession in order for their companies to overcome and to grow through the difficult economic situation. The

respondents indicated as top priority decisions restructuring and optimizing the financial system, cutting down operating costs, eliminating ineffective operational business activities and reforming the reward system. Developing excellent human recourses, developing key people and increasing operational efficiency of IT were mentioned as important actions as well.

Geraldi et al. (2010) proposed the application of three "pillars" that could increase the likelihood of successful crisis management. These pillars were responsive and functioning structure at an organizational level, good interpersonal relationships at a group level and competent people at an individual level. Howsawi et all., (2014) used the Aswan High Dam project in Egypt in the 1960s as a case study and revealed four strategies supporting ten success factors that helped project's success during a period of national crisis. Among these the success factors were having priority and authority, availability of appropriate expertise, knowledge and equipment as needed and communication.

Engwall and Svensson (2004) proposed the concept of "cheetah teams" for responding to the crisis. Hällgren and Wilson (2008) offered 15 remedies to projects in crisis, based on project-as-practiced observation. Their remedies include site teams to undertake overtime works and re-planning.

Gunning JG and Hanna JIC, (2001) wrote a paper recommending ways on how the construction industry might become more effective in preparing for and managing the crisis which may arise. They argued that organization should emphasize to the importance of identifying risks and take appropriate measures to minimize the likelihood of crisis developing. In their paper it was also stated that crisis management planning requires a blend of skills with an effective team approach. Staff must be trained and regular scenario planning in necessary to develop an ability to reduce the effects of any crisis.

Byatt et al. (2012) in their article argued that the crisis has "left its mark" on attitudes towards the project management profession and they review some of the changes and shifts that have occurred, positive or negative. Some of the major changes in the methodology of project management were greater emphasis on project "governance" and limited authorization, a more sophisticated approach to risk management and staffing of more competent and skilful personnel.

Ranong N., (2009), examined the critical success factors for effective risk management procedures showing that the majority of the organizations set up risk management teams, clearly allocate risk management responsibilities and regularly revise risk management plans. In a research conducted by Nourifar (2006) in Iranian construction companies, the results showed that people used to a small extent these ways and that Gantt chart was the most widely used tool.

Existing studies about crisis and the Greek construction sector, deal with a number of aspects, concerning mainly financial issues (Eriotis et al. 2013, Skordoulis et al. 2014) or the impact of economic crisis on Greek SME's (Lacima L. 2014). None of the existing literature about the Greek construction industry addresses to issues of management and leadership effectiveness under the scope of crisis. In the current study, an attempt is being made in order to monitor the reaction of Greek construction companies to the national economic downturn and to examine the prevailing culture within the industry regarding the application of crisis management tools and techniques. Finally, based on the literature review, a list of top priorities actions against crisis was formed and participants were asked to indicate the ones that could enhance management effectiveness.

## 2.8 Best leadership skills needed in period of crisis

In times of economic decline, research shows that the role of the project leader becomes vital. Authors all over the world emphasize the importance of the leadership behaviour adopted under crisis period (Clark G. 2009, Lee et al., 2012) and through their research they propose ways of how leaders should respond in such circumstances. As business environment changes and becomes more complex, it is important that leaders develop a set of skills that will help them respond effectively to crisis (Burnett, 2002).

Previous studies mainly focus on effective communication skills from the leader and development of human resources. According to Bolman & Deal (1997), during crisis period, leaders should focus on decision making, communication, creating organizational capabilities, sustaining an effective organizational culture, managing multiple constituencies, and developing human capital. Weick (1988) has stated that in a crisis situation, leadership is collective and dynamic and it requires perception

and sense-making skills to determine appropriate courses of action. Effective leaders are leaders who manage to encourage staff to actively engage in knowledge acquisition and in the formulation of strategies to resolve the crisis (Dutton & Jackson, 1987).

Most recent studies emphasize on other aspects of leadership as well. Phung (2014) examined the response of Vietnamese private enterprises' leaders under global financial crisis. The three most important qualities of business leaders were focus on sustainable development, working enthusiasm and willingness to take risks. It seemed that these three qualities were appropriate for leaders to address a crisis. Furthermore qualities such as vision, global thinking and clearly understanding the industry were chosen as significant as well.

Orr & Sack (2010), indicated that lack of creativity and ability of developing new ideas and inspiration could bring negative impacts on subordinates in tough times. They also stressed out that in a changing environment the ability to getting the work done by developing others is of major importance. Le (2010) on the other hand strongly emphasized in creativity, learning, justice and influence on other. Kenneth P. et al. (2007) stated that the competencies needed vary by the level of leadership. At the highest leadership level, executives must comprehend the importance of bringing others along as they lead people through tough situations and show decisiveness and courage.

Huvari (2006) in her research found that five of the six most important factors concerning the importance of leadership ability in project management effectiveness, were actually managerial in nature (communicator, motivator, decisive, leadership by example, visionary and technical competent).

For the purposes of this research, having viewed all previous relevant studies, a list of crucial leadership skills was formed and participants were ask to indicate which are the most appropriate for effective leadership under circumstances of economic recession.

## 2.9 Hypotheses statements

In order to make a deeper analysis of the collected information and generate some conclusions that could provide us with a more complete picture of the objectives and locate underlying relations between variables, the following Hypotheses were formed:.

H0: “Years of experience” does not influence the employees' perception about the importance of factors that influence mamangers’ effectiveness.

H1: “Years of experience” influences the employees' perception about the importance of factors that influence mamangers’ effectiveness.

H0: “Authority level” does not influence the employees' perception about the importance of factors that influence mamangers’ effectiveness.

H2: “Authority level” influences the employees' perception about the importance of factors that influence mamangers’ effectiveness

H0: “Company size” does not influence the employees' perception about the importance of the factors.

H3: “Company size” influences the employees' perception about the importance of the factors.

H0: “Project type” does not influence the employees' perception about the importance of the factors.

H4: “Project type” influences the employees' perception about the importance of the factors.

H0: “Company size” does not influence the performance of leadership behavior.

H5: “Company size” influences the performance of leadership behavior.

H0: “Project type” does not influence the performance of leadership behavior.

H6: “Project type” influences the performance of leadership behavior

H0: The degree of use of management tools/methods is similar between “company size” groups.

H7: The degree of use of management tools/methods is not similar between “company size” groups

H0: The degree of use of management tools/methods is similar between “company age” groups.

H8: The degree of use of management tools/methods is not similar between “company age” groups.

H0: The degree of use of management tools/methods is similar between “project type” groups.

H9: The degree of use of management tools/methods is not similar between “project type” groups.

# 3. Research methodology

## 3.1 Research Approach

For the purpose of this research the deductive approach is used as the most suitable. The process of deductive approach (Bell, 2008) is most convenient as it is organized in a more consistent way, each new step follows the previous in a logical sequence and the conclusions are drawn through logical reasoning (Bryman and Bell, 2008). Furthermore the deductive approach is in favor to the researcher when limited time is at disposal as it can be of concise procedures and it investigates specific theory or hyporesearch.

## 3.2 Research Strategy

According to Collis & Hussey (2009), quantitative research is concerned with numbers, which means that it emphasizes quantification in data collection and analysis. The numerical results produced are used in order to test hypotheses deducted from the conjunction of theory and research. In the case of quantitative method, the data is usually collected by the use of questionnaires (Bryman and Bell, 2008).

For the purposes of this study, in combination with the deductive approach, the quantitative research strategy is used. The study involves the identification of factors by means of importance monitoring leadership behavior effectiveness. Importance and effectiveness are both concepts that can be quantified and measured with the use of certain analysis tools such Likert scale type questions and other.

The case study method is a very popular form of analysis that involves an intensive investigation of the particular unit under consideration (Kothari C.R. 2004). This method is a means to well understand a certain “unit” and suggest measures for improvement in the context of the present environment of the concerned “units”. This research uses the case study of Greek financial recession, in order to assist people involved in the industry to comprehend and overcome negative impacts of the crisis on management performance and make all necessary improvements.

## 3.3 Data Collection

### 3.3.1 Primary and secondary data

Data collection can be divided into two types: primary and secondary (Bryman & Bell, 2008; Saunders et al., 2009). Secondary data are data collected and studied from other researchers and when the author and the researcher is the same person the data collected are primary (Saunders et al., 2009).

In this study, both techniques have been used: reviewing the literature and selecting data through the distribution of a questionnaire .

### 3.3.2 Reliability and validity

According to Bryman and Bell (2008) validity is connected with the accuracy and truthfulness of the findings, while reliability is concerned with the consistency of the tool for measuring. The distributed via email questionnaire was not too long so that it wouldn't be tiring and have a bigger possibility of higher rate of return. Furthermore, it was clear and unambiguous in order not to create bias. A pilot study was first conducted in order to make corrections and improvements. Finally the questionnaire addressed to a certain target group of people involved in the construction sector (director, managers, engineers etc) that have been active in the industry, at least the last few years of crisis and were able to comprehend and answer the questions.

Validity was ensured by the Kaiser's Measure of Sampling Adequacy (Kaiser, 1974) which indicates that proportion of variance in the variables may be caused by underlying constructs. The MSA ranges from 0 to 1, reaching one when each variable is perfectly predicted without error by the other variables. According to Kaiser's index (1974) the interpretive adjectives for the Kaiser-Meyer-Olkin Measure of Sampling Adequacy are: in the 0.90 as marvelous, in the 0.80's as meritorious, in the 0.70's as middling, in the 0.60's as mediocre, in the 0.50's as miserable, and below 0.50 as unacceptable.. In this study, the overall MSA for the data set was 0.844, which according to Kaiser's index is classified as meritorious.

### 3.3.3 Structure of questionnaire

The questionnaire consists of 25 questions which are grouped into four sections. The first section (questions 1-12) regards demographic information of the participants,the second section (questions 13-18) aims at identifying the factors that influence the

effectiveness of project managers under crisis conditions and evaluate the leadership behavior of project managers. The questions were based on previous research questionnaires and survey findings (Huvary 2006, Ranong 2009) applying the Managerial Practices Survey (MPS) method (Huvary, 2006).

The third section (questions 11-12 and 19-24) aims at monitoring the situation in the Greek construction sector: how the construction field responded to economic crisis, the companies' tendency to apply crisis management tools and techniques and the perception of people involved about such tools. The forming of possible answers is a combination of investigation based to relevant studies and reports (Thaheem et al. 2013, Hruzova 2011)

The fourth and last part of the survey (questions 24-25) examines top priorities actions that should be taken in order to enhance management effectiveness as well as indicating the most valuable leadership skills and characteristic that a manager should possess under such circumstance The forming of possible answers is a combination of investigation based to relevant studies and formal reports (Ranong 2009, Phung et al. 2014).

The questionnaire includes three types of questions:

- open-ended questions,
- multiple choice questions (with one or more answers),
- questions with an answering scale (a 5-point Likert scale was used with endpoints 1= 'not important' and 5= 'very important' and 5-point Likert scale with endpoints 1= 'very poor' and 5= 'very good')

### 3.3.5 Survey procedure

The research questionnaire was addressed to project managers, project engineers, site supervisors and people that were active in the construction sector (designers, member teams etc). In order to approach representative participants for this research and achieve a satisfying sample figure, a number of construction companies were approached through their HR director. Furthermore, conducts were made with the Greek Organization of Engineers and professional websites like Linkendin, Michanicos, PMI, QPI .

A first draft of the questionnaire was formed and was initially sent to a pilot group of approximately 5 persons in order to locate any omissions and to ensure that the questionnaire was understandable. The questionnaire was send via e-mail and the Google Drive web-platform was used. The link was e-mailed gradually to construction companies, institutions, separate individuals, professional links and engineering blogs.The sample size of respondents is 154 people in the Greek construction sector (managers, members of team projects, freelancers, director managing directors, department managers, project engineers and other).

## 3.4 Data analysis

The statistical analysis performed in this study included descriptive and multivariate statistical methods. The research data set was analyzed by performing descriptive statistics in excel software in order to examine the distribution of responses (frequency) and the respective percentiles.

Multivariate statistical analyses were also used to examine the relationships among variables. Factor analysis is by far the most often used multivariate technique of research studies, especially in the field of social sciences. It is a technique applicable to interdependent observed variables, when the researcher is interested in finding out something more fundamental or latent (Kothari, 2004). By this technique, a large set of measured variables can be resolved, in terms of relativity, into a smaller number of groups, known as factors. In this study Principal Component Analysis (PCA) was preferred over Standard Factor Analysis (SFA). The main reason is because PCA is a more suitable tool when the aim is empirical conclusions and summaries on the collected data. In the contrary SFA is usually used theoretical research situations where the intereste is in developing a theory.

ANOVA and cross tabs were used to examine whether the answers of the respondents varied depending their demographic characteristics and test the hypotheses stated. The most frequently used tests for estimating population parameters and hypotheses testing are z-test, t-test, $\chi 2$-test and F-test (ANOVA). All these tests are based on the assumption of normality and they are applicable in most cases due to the fact that we mostly deal with samples and the sampling distributions closely approach normal distributions. For the purposes of this study F-test is used. F-test is based on F-distribution and is used in the context of analysis of variance (ANOVA) in examining

the significance of the difference amongst more than two sample means at the same time (Kothari, 2004). SPSS v17 was used to perform the aforementioned multivariate statistical analysis.

### 3.5 Demographic characteristics

The sample consists of 154 participants located in various cities in Greece . Between 31 and 40 years are 85 participants which is the majority percentage (55,19%). The vast majority (60,39%) hold a master certificate, a 3,25% have fulfilled a doctorate and 30,52% have finished higher institution studies and only a 9,09% have graduated from a technical institution. A percentage of 38,96% have 11-20 years of experience, while 33,12% are between 6 to 10years of experience . Regarding the job title, due to the peculiarities of the sector, participants could choose more than one answers. The majority is project managers (30), members in project teams (31) and freelancers (46).

For reasons of further analysis different job position were categorized into three authority level groups. High level of authority includes directors, general managers and department managers. Middle level of authority group consists of project managers, project engineers and site supervisors while designers and team members are considered of low authority level. Freelancers constituted a separate group.

The majority of the companies are small or very small companies (sustain a number of employees up to 50 people) (50,65%). Freelancers represent a 16,23% while large companies (over 250 employees) sustain almost a quarter of the research sample (22,08% ). Medium companies represent 11,04% of the sample .

For reasons of further analysis the different fields of construction project were categorized into three types of projects according their complexity, size and difficulty. “Type I” (low complexity ), “Type II” (medium complexity) and “Type III” (high complexity).

## 4. Descriptive statistics

### 4.2 Descriptive statistics of management and leadership effectiveness

The second section of the questionnaire (questions 13-18) constitutes the main part of the survey and aims at the identification of the factors that influence the effectiveness

of project managers under crisis conditions and the impact that these conditions had on the leadership behavior of project managers. The questions regarding the identification of factors were based to previous research questionnaires and survey findings (Huvary, I. 2006, Ranong, PN. 2009). The most frequently cited factors were located, grouped under five main categories and were examined under the scope of economic recession. Leadership effectiveness part was assessed according to the Managerial Practices Survey (MPS) method which has been used from many researchers before (Huvary, I. 2006). It is important to note that leadership effectiveness was administered in this survey in terms of the leader's performance.

### 4.2.1 Factors of management effectiveness

Regarding the priority of importance of factors during the economic crisis (questions 13-17), the top five factors indicated by the participants are "Adequate funds with a mean" of 4,54, "Ability to coordinate" (4,53), "Communication" (4,36), "Ability to delegate authority" (4,35) and "Clear job descriptions" (4,34). It is noticeable that out of the total number of 32 factors presented (Table 4.1), top ten factors are equally distinguished to all five category groups. It is also important to highlight that no mean is smaller than 3.

The findings could be characterized as consistent with previous literature, emphasizing more on the importance of factor "Adequate funds/resources", which is more or less expected considering the scope of crisis under which all the above are examined. Comparing the finding of this survey in terms of importance with the findings of other relevant researches (Ranong 2009, Irya Hyväri 2006, Ofori 2013, Chan et al 2013 etc ), "Adequate funds/resources" and "Communication" are indicated as primary factors as well. In this study special importance is given in the skills of the project manager while in previous ones (Hyvary, H. 2006, Ofori, D.F. 2013), "Top management support" was recognized among leading positions.

### 4.2.2 Leadership behaviour effectiveness

Concerning the evaluation of the leadership behaviour of project managers during crisis (question 18) findings are really interesting. Managers seem to have better

leadership performance on skills of “Decision making”, “Problem solving”, “Monitoring/Networking”, “Planning/Organizing” and “Informing/Clarifying” which are actually considered to be managerial ones. It is also interesting that “Motivating/Inspiring” is ranked last. One can draw the conclusion that managers in the Greek construction sector do not performer as well when it comes to matters that have to do with the narrow concept of leadership which mainly consists of skills like inspiring, motivating and supporting. However there are no significant differences between different skills performance as the means of the items range from 3,45 (lowest score) to 3,95 (highest score). No mean was greater than 4.00. The general picture is that leadership behaviour under crisis exhibits mediocre levels of performance.

## 4.3 Descriptive statistics about management of crisis in Greece by the construction companies

The third section of the survey (questions 11-12 and 19-24) aims at monitoring the situation in the Greek construction sector, concerning the reaction of the construction companies to the current economic recession as their familiarity with the use of crisis management tools and their perception about them. In order to report the results frequencies, ranking and crosstab tables are developed. The multiple choice answers are based on relevant studies and reports (Thaheem et al. 2013, Hruzova H. 2011)

**Table 4.2: Evaluation of project manager’s leadership behaviour**

| | ***very poor*** | ***poor*** | ***medium*** | ***good*** | ***very good*** | ***MEAN*** | ***SD*** | ***N*** | ***Rank*** |
|---|---|---|---|---|---|---|---|---|---|
| | **1** | **2** | **3** | **4** | **5** | | | | |
| **Leadeship skills** | | | | | | | | | |
| **Planning/ Organizing** | 0 | 11 | 42 | 75 | 26 | 3,75 | 0,82 | 154 | **4** |
| | 0,00% | 7,14% | 27,27% | 48,70% | 16,88% | | | | |
| **Effectivelly Communicating** | 4 | 10 | 42 | 66 | 32 | 3,727 | 0,95 | 154 | 6 |
| | 2,60% | 6,49% | 27,27% | 42,86% | 20,78% | | | | |
| **Problem solving** | 2 | 5 | 34 | 75 | 38 | 3,92 | 0,84 | 154 | **2** |
| | 1,30% | 3,25% | 22,08% | 48,70% | 24,68% | | | | |
| **Decision making** | 1 | 6 | 37 | 66 | 44 | 3,95 | 0,86 | 154 | **1** |
| | 0,65% | 3,90% | 24,03% | 42,86% | 28,57% | | | | |
| **Monitoring/ Networking** | 1 | 9 | 45 | 60 | 39 | 3,82 | 0,90 | 154 | **3** |
| | 0,65% | 5,84% | 29,22% | 38,96% | 25,32% | | | | |
| **Informing/ Claryfing** | 6 | 11 | 41 | 56 | 40 | 3,734 | 1,05 | 154 | **5** |
| | 3,90% | 7,14% | 26,62% | 36,36% | 25,97% | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Motivating/ Inspiring | 7 | 23 | 46 | 49 | 29 | 3,45 | 1,10 | 154 | 12 |
| | 4,55% | 14,94% | 29,87% | 31,82% | 18,83% | | | | |
| Team building/ Developing member teams | 9 | 15 | 48 | 54 | 28 | 3,50 | 1,08 | 154 | 11 |
| | 5,84% | 9,74% | 31,17% | 35,06% | 18,18% | | | | |
| Supporting/ Consulting | 7 | 9 | 41 | 65 | 32 | 3,69 | 1,01 | 154 | 7 |
| | 4,55% | 5,84% | 26,62% | 42,21% | 20,78% | | | | |
| Recognising/ Rewarding | 12 | 13 | 43 | 57 | 29 | 3,51 | 1,13 | 154 | 10 |
| | 7,79% | 8,44% | 27,92% | 37,01% | 18,83% | | | | |
| Management of conflicts | 6 | 13 | 50 | 57 | 28 | 3,57 | 1,01 | 154 | 9 |
| | 3,90% | 8,44% | 32,47% | 37,01% | 18,18% | | | | |
| Delegating tasks/ responsibilities | 3 | 14 | 39 | 73 | 25 | 3,67 | 0,92 | 154 | 8 |
| | 1,95% | 9,09% | 25,32% | 47,40% | 16,23% | | | | |

### 4.3.1 Response to crisis.

Regarding the reaction of the companies in order to confront crisis (question 11), more than 50% of them chose to Emphasis on lower price" and "Reduction or change in staffing". Examining the relevant crosstab, there are similarities in reactions between small companies and freelancers as well as between medium and large companies.

**Table 4.3 Ranking of responses to crisis**

| Responce to crisis | Frequency | Rank |
|---|---|---|
| Change in priorities of tasks within the project | 32 | 5 |
| Budget cutting while maintaining the contracted | 52 | 3 |
| Postponement of project implementation | 28 | 7 |
| Reducing the number of new projects | 49 | 4 |
| Emphasis on lower price | 83 | 1 |
| Reduction or change in staffing | 68 | 2 |
| Redefining of project objectives | 24 | 10 |
| Reassessment of project risks | 28 | 8 |
| Outsourcing project activities | 18 | 11 |
| Shortening of project activity phases | 25 | 9 |
| Cancellation of project implementation | 29 | 6 |
| Merging projects | 5 | 15 |
| Cancellation of already mitigated projects | 7 | 13 |
| Other | 7 | 14 |

In question 12, participants were asked to further indicate their degree of agreement regarding their company's actions. A sum percentage of 59,09% seem to generally agree with the actions taken (Table 4.5, see Appendix III).

### 4.3.2 Use and perception about management tools

This set of questions (questions 19-24) refers to the companies' tendency to use crisis management tools and techniques and the perception of people involved about such tools. The factor of communication is especially investigated.

Regarding the use of management tools (Table 4.6) only a 24,68% uses them in an ordinary basis. A 48,70% makes an occasional use and 26,62% don't use them at all The main area of use of management tools, in terms of the project life-cycle, is "Project planning/organizing" for all company sizes. Large companies seem to make use of management tools a bit more during the realization of the project, while freelancers don't seem to be significantly familiar with the use of management tools (Table 4.7, see Appendix III).

**Table 4.6 Use of management tools frequencies**

| Use of management tools | Frequency | % |
|---|---|---|
| ***No*** | 41 | 26,62% |
| ***rarely*** | 13 | 8,44% |
| ***Sometimes*** | 33 | 21,43% |
| ***often*** | 29 | 18,83% |
| ***Yes*** | 38 | 24,68% |
| ***total*** | 154 | 100% |

The degree of the users' satisfaction from the use of management tools is reported in Table 4.8 (see Appendix III). According to the statistics, a 32,47% appears to be satisfied, while a sum of 38,31% is little satisfied or neutral.

The familiarity of the construction sector with the use of methods and techniques regarding the initial stage of crisis management process which is the identification of possible risks and crisis is presented in Table 4.9. Brain-storming gathers 88 preferences out of 378 totally indicated and is identified as the most used tool for foreseeing difficulties and potential crisis situations. Software tools and process flow charts come up next in the participants' responses, while "SWOT analysis", "Decision trees" and "Cause effect" diagrams are not particularly used by construction companies in anticipating probable risks.

**Table 4.9 Ranking of crisis identification tools used**

| Crisis identification tools | Frequency | Rank |
|---|---|---|
| **Brainstroming** | **83** | **1** |
| Documentation reviews | 44 | 4 |
| Decision trees | 14 | 10 |
| Interviewing-research | 17 | 8 |
| Asssumptions analysis | 27 | 6 |

| | | |
|---|---|---|
| Root cause identification | 35 | 5 |
| SWOT analysis | 17 | 9 |
| Cause & effect diagram | 10 | 11 |
| **Process flow chart** | **45** | **3** |
| **Software tools (e.g.excel,primavera ect)** | **59** | **2** |
| My company/I don't use such tools | 26 | 7 |
| Other | 1 | 12 |

The research also revealed that the years that the company is active does not seem to affect the first preference in use of crisis identification tools which is Brain-storming. However differences between groups are observed regarding the second and third most used tools For the 0-5 years category “Process flow chart” is the second most used tool while for the rest of groups (over 5 years) “Software tools” comes second. Especially for the category of 11-20 years “Documentation reviews” is equally used. (Table 4.10, see Appendix III)

The last question of this section investigates the ways of communication used by construction companies and their frequencies using a six-point Likert scale with end-points 1=never and 6=always (Table 4.11, see Appendix III). Findings reveal that the most frequently used tools are “e-mailing” and “face to face” with a frequency mean greater than 5,0. “Telephone” follows with a mean of 4,99. “Meetings” come fourth (4,35) which is quite surprising, as they considered to be essential, especially in a dynamic process such as a construction project where many people are involved and all information must be transmitted clearly and quickly to everyone.

## 4.4 Descriptive statistics of dealing with crisis.

The fourth and last part of the survey (questions 24-25) asks participant to express their opinion about top priorities regarding actions that should be taken in order to enhance management effectiveness as well as indicating the most valuable leadership skills and characteristic that a manager should possess under such circumstance, in order to function effectively and efficiently. The forming of possible answers is a combination of investigation based to previous relevant studies and formal statistic reports (Phung et al. 2014, Ranong P., 2009).

### 4.4.1 Suggestions for enhancing project managers' effectiveness

Regarding the enhancement of management effectiveness under crisis conditions, almost 2/3 of the sample size indicated as top priority "Eliminating ineffective operational business (100 picks). "Training of human resources" and "project managers" hold second and third place respectively, with a significant difference from the next answers in row. "Implementation of new crisis management tools/strategies/methods" received 58 ticks and is fourth in the row, while "Developing key people for crisis management" received 44 ticks and was ranked eighth.

**Table 4.12 Suggestions for enhancing managers' effectiveness**

| **Suggestions for enhancing managers' effectiveness** | **Frequency** | **Rank** |
|---|---|---|
| Laying off "bad" employees | 39 | 9 |
| **Eliminating ineffective operational business activities** | 100 | **1** |
| Reforming reward system | 54 | 5 |
| **Training/Developing project managers/leaders** | **64** | **3** |
| **Training/Developing human resources** | **88** | **2** |
| Enhacing authorities of certain managerial positions | 21 | 11 |
| **Implementation of new crisis management tools/strategies/methods** | **58** | **4** |
| Restructuring of the organizational structure | 51 | 7 |
| Developing key people for crisis management | 44 | 8 |
| Increasing operational efficiency of IT | 52 | 6 |
| Enhacing the use of crisis management tools | 23 | 10 |
| Other | 1 | **12** |

In order to investigate whether the perceptions are influenced by the level of authority, respondents were classified into three groups of authority level (high, medium and lower level) in correspondence to their job title while freelancers were considered a distinct group. Findings show that perceptions, about top priorities for the improvement of project management effectiveness, seems to converge among different groups (Table 4.13, see Appendix III).

### 4.4.2 Effective leadership behaviour

The final question of the survey is an attempt to record the perception of people involved in the construction sector about what are the essential leadership characteristics and skills that managers should possess, under the current crisis

circumstances, in order to perform their leadership role effectively. The ranking of skills along with their frequencies are presented in the table below.

**Table 4.14 Critical skills of effective leadership behaviour**

| Leadership characteristics | Frequency | Rank |
|---|---|---|
| **Technical competence and industry knowledge** | **87** | **2** |
| **Decisiveness** | **94** | **1** |
| Creativity | 55 | 7 |
| Sustainability | 31 | 12 |
| Practicality | 58 | 6 |
| **Consistency** | **64** | **5** |
| Willingness to take risks | 27 | 13 |
| Working enthusiam | 23 | 14 |
| Righteous | 51 | 10 |
| Global thinking | 55 | 8 |
| **Good communicator** | **69** | **3** |
| **Inspiring/influential/good motivator** | **68** | **4** |
| Supportive to the group members | 54 | 9 |
| Encourages new ideas | 32 | 11 |
| Other | 2 | 15 |

The five most appropriate features indicated are “Decisiveness”, “Technical competence and industry knowledge”, “Good communicator”, “Inspiring/influential/good motivator” and “Consistency”. It is worth to notice that four out of five top features are actual managerial. Therefore, it is not wrong to argue that in times of economic recession, leading a construction project requires skills of a more administrative nature than of motivational support and spiritual guidance.

In order to further examine perceptions between groups, answers were compared regarding the years of experience of each respondent. Analysis shows significant differences in opinions between groups (Table 4.15, see Appendix III). The first two groups of 0-5 years and 6-10 years seem to share the same opinion about three most important skills. However these skills are ranked differently. “Technical competence and industry knowledge” is ranked first by the group 0-5 years and third by the group 6-10 years. “Good communicator” is ranked second by the group 0-5 years and first by the group 6-10 years. Finally “Decisiveness” is ranked third by the group 0-5 and second by the group 6-10. The rest two groups, even though they agree that “Decisiveness” and “Technical competence and industry knowledge” are the first two most important skills, they have totally different opinions regarding the third important skill. Group 11-20 years indicate “Inspiring/influential/good motivator” while group over 20 years put “Practicality” in the third place.

# 5.Factor analysis

## 5.1 Procedure and findings

Applying Principal Component Analysis (PCA) to the data set, the initial figure of the 32 variables measured from the survey was reduced to a smaller number of factors, by identifying relationships among them or underlying common characteristic. The Kaiser's Measure of Sampling Adequacy for the data set was 0.844, which according to Kaiser's index is classified as meritorious. The Barlett's Test of Sphericity was also conducted to test correlations among variable and the suitability of PCA. The null hyporesearch, stated for the test, supported that there were no common factors among the data set. The test results rejected the null hyporesearch (Sig <0, 05), indicating that the correlations among the variables were significant and confirmed the suitability of data for factor analysis. The results of the tests are summarized in the Table below.

**Table 5.1 KMO and Bartlett's Test**

| | | |
|---|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | ,844 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 1930,208 |
| | Df | 496 |
| | Sig. | ,000 |

After the aforementioned tests of adequacy and sphericity, the primary component analysis procedure was conducted in SPSS. Maximum likelihood (VARIMAX), an orthogonal rotation method, was chosen for exploratory factor analysis. By retaining components with associated Eigenvalues greater than one (the Kaiser-Guttman rule), 9 components were initially identified that explained the majority of variability in the data set. The extracted 9 components accounted for 64,156% of variance in the correlation matrix. Running the analysis for second time, aiming at a smaller number of components that would explain the majority (>50%) of the variability of the data, the criteria of Eingenvalue was set at 1,2. The number of constructs was further reduced to six components, explaining a percentage of 53,767%. Table 5.2 shows the Eigenvalues and the proportions of variance explained by each component

**Table 5.2 Total Variance Explained**

| a/a | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | | Rotation Sums of Squared Loadings | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total | Var/nce % | Cum/tive % | Total | Var/nce % | Cum/tive % | Total | Var/nce % | Cum/tive % |
| 1 | 9,092 | 28,411 | 28,411 | 9,092 | 28,411 | 28,411 | 4,525 | 14,140 | 14,140 |
| 2 | 1,962 | 6,132 | 34,543 | 1,962 | 6,132 | 34,543 | 3,368 | 10,526 | 24,666 |
| 3 | 1,768 | 5,525 | 40,068 | 1,768 | 5,525 | 40,068 | 2,816 | 8,799 | 33,464 |
| 4 | 1,605 | 5,015 | 45,083 | 1,605 | 5,015 | 45,083 | 2,480 | 7,750 | 41,215 |
| 5 | 1,463 | 4,571 | 49,654 | 1,463 | 4,571 | 49,654 | 2,210 | 6,905 | 48,120 |
| 6 | 1,316 | 4,113 | 53,767 | 1,316 | 4,113 | 53,767 | 1,807 | 5,648 | 53,767 |

Extraction Method: Principal Component Analysis.

The 32 factors with impact on managers' effectiveness under conditions of economic recession, retrieved from the literature, were summarized into 6 components identified by performing the Principal Component Analysis. Each of the 32 initial variables, loaded at least once to one of the summarized 6 components. The loadings, greater than 0,30 were considered significant . Some of the initial 32 factors could be grouped under more than one component as they appeared cross loadings in more than one of the components retrieved from analysis. In the table of loadings presented, the grouping was based on the highest loadings of each factor among the six components. The components extracted were named according the context of their items.

**Table 5.3 Factor loadings**

| Components | Effectiveness factors | Loadings |
|---|---|---|
| **Organization and Human Resources** | Organization structure | ,647 |
| | Ability to delegate authority | ,640 |
| | Ability to coordinate | ,619 |
| | Clear job descriptions | ,602 |
| | Technical background | ,592 |
| | Perception of his/her role & responsibilities | ,590 |
| | Relevant past experience | ,561 |
| | Top management support & commitment | ,551 |
| **Project realization issues** | Contract management | ,676 |
| | Management of changes in orders, designs ect | ,590 |
| | Situational management | ,572 |
| | Effective monitoring and feedback | ,548 |
| | Effective leadership behaviour | ,536 |
| | Subcontractors | ,514 |
| | Nature/weather conditons/site conditions | ,504 |
| | Effective conflict resolution | ,479 |
| | Trouble shooting | ,437 |
| **"Organizational bond"and** | Social environment | ,675 |

| | | |
|---|---|---|
| **technology background** | Appropriate technologies at disposal | ,630 |
| | Information technology | ,615 |
| | Commitment | ,568 |
| | Trust | ,547 |
| **Planning/organizing issues** | Clear goals & objectives | ,697 |
| | Realistic cost &time schedule | ,602 |
| | Communication | ,421 |
| | Adequate fund/resources | ,412 |
| **General environment** | Economic environment | ,777 |
| | Political environment | ,702 |
| | Competitors' Presence | ,594 |
| **Project features** | Size and value of the project | ,766 |
| | Uniqueness of the project's actrivities/tasks | ,637 |
| | Density of the project network, dependencies between project activities | ,394 |

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 17 iterations.

Component 1, which may be referred to as “Organization and Human Resources”, had an eigenvalue of 9,092 and explained 28,411% of variance in the data set. This component had significant high loadings (0,600 < l < 0,800) on “Organization structure”, “Ability to delegate authority”, “Ability to coordinate”, “Clear job descriptions” and moderate loadings (0,400 < l < 0,600) on “Technical background”, “Perception of his/her role & responsibilities”, “Relevant past experience” and “Top management support & commitment”. Component 1 mainly refers to the skills and competences of human resources including all levels of authority (managers, working teams etc.) as well as the special features of the organization as an entity.

Component 2, which may be called “Project realization issues”, had an eigenvalue of 1,962 and explained 6,132% of variance. Component 2 had significant high loadings (0,600 < l < 0,800) on “Contract management” and moderate loadings (0,400 < l < 0,600) on “Management of changes in orders/designs etc”, “Situational management”, “Effective monitoring and feedback”, “Effective leadership behaviour”, “Subcontractors”, “Nature/weather conditions/site conditions”, “Effective conflict resolution”, “Trouble shooting”. Component 2 mainly addresses on issues having to do with the realization of the project like the handling of problems and the administration of certain procedures.

Component 3, which may be referred to as “"Organizational bond" and technology background”, had an eigenvalue of 1,768 and explained 5,525% of variance. In this

component factors of “Social environment”, “Appropriate technologies at disposal” and “Information technology” scored significant high loadings (0,600 < l < 0,800), while “Commitment” and “Trust” scored moderate ones (0,40 < l < 0,60).

Component 4, which may be labelled as “Planning/organizing issues”, had an eigenvalue of 1,463 and explained 5,015% of variance. Component 4 refers to factors “Clear goals & objectives” and “Realistic cost & time schedule”, which scored significantly high (0,600 < l < 0,800) and to factors “Communication” and “Adequate funds/resources”, which had moderate loadings (0,400 < l < 0,600). In general component 4 mainly addresses to the planning and organizing part of the project life cycle.

Component 5, which may be named “General environment”, had an eigenvalue of 1,463and explained 4.571% of variance. Component 5 had significant high loadings (0,600 < l < 0,800) on “Economic environment” and “Political environment” and moderate loadings on “Competitors' Presence”.

Component 6, which may be referred to as “Project features”, had an eigenvalue of 1,316 and explained 4.113% of common variance. Component 6 had significant high loadings (0,600 < l < 0,800) on “Size and value of the project”, “Uniqueness of the project's activities/tasks” and poor loadings (0,394) on “Density of the project network, dependencies between project activities”.

# 6. Inferential statistics

## 6.1 Introduction

Inferential analysis is concerned with the various tests of significance for testing hypotheses in order to determine the degree of data validity and to indicate some conclusions (Kothari, 2004).

In this section the factors than influence management effectiveness are being examined in order to detect differences in the mean values of the importance of these factors given by the respondents, in relation to certain demographic groups. For reasons of space limitations, the demographic features being examined are “total experience”, “authority level”, “company size” and “project type”. Findings of the analysis are presented in more details below.

## 6.2 Analysis of variance for factors' importance in management effectiveness.

ANOVA for "Total experience" and "Authority level"

Hypotheses statements

H0: "Years of experience" does not influence the employees' perception about the importance of factors that influence mamangers' effectiveness.

H1: "Years of tal experience" influences the employees' perception importance of factors that influence mamangers' effectiveness.

H0: "Authority level" does not influence the employees' perception about the importance of factors that influence mamangers' effectiveness.

H2: "Authority level" influences the employees' perception about the importance of factors that influence mamangers' effectiveness.

One-way analysis of variance was performed to test the hyporesearch that similarity of perceptions exist among different groups of "total experience" and "authority level" of respondents. At $\alpha=0.05$, the results of the tests were not significant ($F<2,665$, $Sig>0, 05$) which supports the null hyporesearch that the different groups of respondents had similar perception about factors' importance. The conclusion drawn is that years of "total experience" and "authority level" do not influence the perception of people involved about the importance of the factors. Tables are presented in Appendix III (Tables 6.1 and 6.2).

ANOVA for "Company size" and "Project type"

Hypotheses statements

H0: "Company size" does not influence the employees' perception about the importance of factors that influence mamangers' effectiveness.

H3: "Company size" influences the employees' perception about the importance of factors that influence mamangers' effectiveness.

H0: "Project type" does not influence the employees' perception about the importance of factors that influence mamangers' effectiveness.

H4: “Project type” influences the employees' perception about the importance of factors that influence mamangers’ effectiveness.

One-way analysis of variance was performed to test the hyporesearch that similarity of perceptions exist among different groups of “company size” and “project type” of respondents. Analysis results revealed significant differences between groups. At $\alpha=0.05$ level, the different groups of “company size” had significant different perceptions ($p<0.05$ and $F>2,66$) about the importance of factors “Density of the project network, dependencies between project activities”, “Ability to coordinate”, “Effective conflict resolution”, “Technical background” and “Political environment”, which lead to rejection of the null Hyporesearch for these factors.

| **6.3 ANOVA for Factors' importance and “Company size”** | | | | | | |
|---|---|---|---|---|---|---|
| Density of the project network, dependencies between project activities | Between Groups | 7,352 | 3 | 2,451 | 2,896 | ,037 |
| | Within Groups | 126,915 | 150 | ,846 | | |
| | Total | 134,266 | 153 | | | |
| Ability to coordinate | Between Groups | 5,305 | 3 | 1,768 | 3,954 | ,010 |
| | Within Groups | 67,091 | 150 | ,447 | | |
| | Total | 72,396 | 153 | | | |
| Effective conflict resolution | Between Groups | 6,571 | 3 | 2,190 | 3,252 | ,024 |
| | Within Groups | 101,039 | 150 | ,674 | | |
| | Total | 107,610 | 153 | | | |
| Technical background | Between Groups | 4,404 | 3 | 1,468 | 2,780 | ,043 |
| | Within Groups | 79,207 | 150 | ,528 | | |
| | Total | 83,610 | 153 | | | |
| Political environment | Between Groups | 10,282 | 3 | 3,427 | 3,236 | ,024 |
| | Within Groups | 158,842 | 150 | 1,059 | | |
| | Total | 169,123 | 153 | | | |

Regarding the different groups of “project type ”, at $\alpha=0.05$ level, there are significant different perceptions ($p<0.05$ and $F>3,06$) about the importance of factors “Density of the project network, dependencies between project activities”, “Perception of his/her role and responsibilities”, “Effective leadership behaviour”, “Effective conflict resolution”, “Relevant past experience”, “Situational management”, “Technical

background" "Political environment" and "Economic environment", which lead to rejection of the null Hyporesearch for these factors (Table 6.4, see Appendix IV).

## 6.3 Analysis of variance for leadership effectiveness

One-way ANOVA was performed to test the hyporesearch that the degree of leadership effectiveness indicated by respondents, in terms of performance, is similar among different groups of "company size" and "project type". Analysis results revealed significant differences between groups .

*ANOVA for "Company size"*

*Hypotheses statements*

H0: "Company size" does not influence the performance of leadership behaviour.

H5: "Company size" influences the performance of leadership behaviour.

**Table 6.5 ANOVA for leadership behaviour performance and "company size"**

| | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| Planning /organizing | Between Groups | 7,699 | 3 | 2,566 | 4,056 | ,008 |
| | Within Groups | 94,924 | 150 | ,633 | | |
| | Total | 102,623 | 153 | | | |
| Decision making | Between Groups | 6,225 | 3 | 2,075 | 2,899 | ,037 |
| | Within Groups | 107,360 | 150 | ,716 | | |
| | Total | 113,584 | 153 | | | |

Due to space limitation, only factors with significant differences are presented. At $\alpha$=0.05 level, leadership behaviour in different groups of "company size", is significantly different concerning the skills "Planning/organizing" and "Decision making" ($p<0.05$ and $F>2,66$). Therefore, the null Hyporesearch is rejected, which means that "company size" influences leadership performance "Planning/organizing" and "Decision making". For the rest leadership skills, no significant differences were observed.

*ANOVA for "Project type"*

*Hypotheses statements*

H0: “Project type” does not influence the performance of leadership behavior.

H6: “Project type” influences the performance of leadership behaviour.

According to Table 6.6 (see Appendix IV), at α=0.05 level, leadership behaviour in different groups of “project type”, demonstrates similar performances for all leadership skills (p>0.05 and F<3,06). Therefore, the null Hyporesearch is accepted, which means that “project type” does not have significant different impact on leadership effectiveness in terms of leadership skills performance.

## 6.4 Analysis of variance for project management tools and methods

One-way ANOVA was performed to test the hyporesearch that there is no difference in the degree of use of management tools among different groups of “company size”, “company age” and “project type”. Below are presented the Hypotheses statements and the relevant results

*ANOVA for “Use of management tools/methods” and “company size”*

*Hypotheses statements*

H0: The degree of use of management tools/methods is similar between “company size” groups.

H7: The degree of use of management tools/methods is not similar between “company size” groups.

**6.7 ANOVA for use of management tools and company size**

| | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Between Groups | 56,966 | 3 | 18,989 | 9,482 | ,000 |
| Within Groups | 300,385 | 150 | 2,003 | | |
| Total | 357,351 | 153 | | | |

Analysis results revealed significant differences between groups. At α=0.05 level, the different groups of “company size” demonstrate significant differences in the degree of use of management tools (p<0.05 and F>2,66), therefore the null Hyporesearch is rejected. Table 6.8 (see Appendix IV) shows that large and medium size companies

demonstrate a similar degree of use of the tools and significantly higher than that of small size companies and freelancers.

*ANOVA for "Use of management tools/methods" and "company age"*

*Hypotheses statements*

H0: The degree of use of management tools/methods is similar between "company age" groups.

H8: The degree of use of management tools/methods is not similar between "company age" groups.

| **6.9 ANOVA use of management tools and company age** | | | | | |
|---|---|---|---|---|---|
| Use of project management tools/methods | | | | | |
| | Sum of Squares | df | Mean Square | F | Sig. |
| Between Groups | 12,657 | 3 | 4,219 | 1,836 | ,143 |
| Within Groups | 344,693 | 150 | 2,298 | | |
| Total | 357,351 | 153 | | | |

Analysis results didn't reveal significant differences between groups. At $\alpha$=0.05 level, the different groups of "company age" demonstrate similar means in the degree of use of management tools ($p>0.05$ and $F<2,66$), therefore the null Hyporesearch is accepted.

*ANOVA for "Use of management tools/methods" and "project type"*

*Hypotheses statements*

H0: The degree of use of management tools/methods is similar between "project type" groups.

H9: The degree of use of management tools/methods is not similar between "project type" groups.

| **6.11 ANOVA for use of management tools and project type** | | | | | |
|---|---|---|---|---|---|
| Use of project management tools/methods | | | | | |
| | Sum of Squares | df | Mean Square | F | Sig. |

| | | | | | |
|---|---|---|---|---|---|
| Between Groups | 38,560 | 2 | 19,280 | 9,132 | ,000 |
| Within Groups | 318,791 | 151 | 2,111 | | |
| Total | 357,351 | 153 | | | |

Analysis results revealed significant differences between groups. At $\alpha$=0.05 level, the different groups of "project type" demonstrate significant differences in the degree of use of management tools ($p<0.05$ and $F>3,06$), therefore the null Hyporesearch is rejected. Type II (Office Buildings, Hospitals, Parks, Industrial buildings) and Type III (Transportation and Marine project) constructions projects demonstrate a similar degree of use of the tools and significantly higher than that of Type I projects (Housing, Energy project).

# 7. Discussion

## 7.1 Research findings and comparisons

The aim of this research is to investigate the impact of economic recession in Greece on leadership and management effectiveness issues in the construction sector. For this purpose a study was conducted, addressing to managers and engineers in construction companies and inviting them to answer to a number of relative questions. In this section the research findings of the survey are being briefly discussed and compared with existing literature.

From the responses of 154 participants, the findings indicate that the 8 most important factors that influence the effectiveness of project managers are "Adequate funds/resources", "Ability to coordinate", "Communication", "Ability to delegate authority", "Clear job descriptions", "Trust", "Effective leadership behaviour" and "Economic Environment". It is noticeable that out of the total initial 32 factors, no importance mean was smaller than 3.

Below (Table 7.1) are presented the findings of similar researches. According to the table factors "Adequate funds/resources" and "Communication" has been distinguished as critical factors from many researchers (Ranong 2009, Irya Hyväri 2006, Ofori 2013, Chan et al 2013 etc). "Adequate funds/resources", which has been recognized as the factor of the highest importance in this study, even though it is cited in the others studies as well, it doesn't hold the leading rank. This was more or less

expected, as the background of this study was the recent economic uncertainty in Greece. Likewise, factor "Economic Environment comes 8th in ranking position in this study, while it does not appear in top positions in the other studies. Furthomore, "Top Management Support" was ranked 12th in this study, while it was distinguished among leading factors in the other studies. "Competence", either of PM, owner or personnel in general can be located in almost all the above studies. In this study, 3 out 8 most important factors refer to ability in administrative issues issues.

**Table 7.1 : Sunnary of critical factors retrieved from literature**

| Jha & Iyer (2006) | Hyvari (2006) | Ofori (2013) | Nourifar (2006) | Ranong 2009 |
|---|---|---|---|---|
| Project Manager's Competence | Top Management Support | Effective communication, coordination and commitment | Realistic schedule | Commitment and support from top management |
| Top Management Support | Information/Communication | Top management support | Appropriate and adequate resources and budget allocations | Communication |
| Monitoring and Feedback by Project Participants | Client Involvement | Effective planning | Clear project objectives | Information Technolog |
| Interaction among Project Participants | Competent Project Team | Experienced & competent personnel | | Trust |
| Owners' Competence | Problem Solving Abilities | Teamwork | | Organization Structure |
| | Adequate Resources | Good leadership | | Culture |
| | Monitor performance and feedback | | | Training |
| | Project mission/common goals | | | |

In general there are similarities in the findings of this study with the findings of relevant studies in the past regarding the importance of communication, leadership behavior and competence of human resources. However special importance was given by the participants of this study in financial issues, which could undoubtedly be an impact of the Greek economic crisis.

In order to summarize the 32 factors examined in this study into a smaller number of grouped factors Primary Component Analysis was conducted. 6 Components were retrieved and were labeled as "Organization and Human Resources", "Project realization issues", "Organizational bond and technology background", "Planning/organizing issues", "General environment" and "Project features".

Regarding management effectiveness factors, analysis of variance was also conducted in order to identify differences between groups. Analysis showed that "Total

experience" and "Authority level" does not influence the employees' perception about the importance of the factors. On the contrary "Company size" and "Project type" influences the employees' perception about the importance of the factors. It is interesting that people's opinion is affected by the features of the company that they work for and the distinct type of the construction project and not by their professional status and background.

The effect of economic crisis could be recognized in the perception of participants, as the size of the company has an important role in coping with crisis and it is generally recognized that large companies had a financial advantage in comparison with small and medium ones. Furthermore reduction in the number of project observed was greater in certain types of projects like housing and industrial buildings. These different amounts of impacts of the economic crisis, lead to different perceptions about importance of factors, depending on the type of project that the respondent has in this mind.

Concerning the leadership performance of PM under crisis conditions, the findings of this research reveal that managers exhibit a medium performance in all leadership skills, as their performance measure ranges between 3,45 to 3,96. Their best performance is noticed in "Decision making", "Problem Solving" and "Informing/Clarifying" which are actually managerial kills. This result indicates the tendency that exists in construction industry where special attention is given in practical and technical issues rather than in psychological and motivation issues. This tendency is also depicted in the results of the question where participants were asked to indicate the ideal characteristics of a leader in circumstances of economic crisis. Top 7 skills identified were "Decisiveness", "Technical competence and industry knowledge", "Good communicator", "Inspiring/influential/good motivator", "Consistency", "Practicality" and "Creativity".

The results of similar studies are shown below (Table 7.2). Common skills among studies are highlighted in bold. It is ones again noticed that people involved in the construction sector believe that skills of greater importance for a leader are the ones that have to do with competence, consistency and administrative capabilities. Comparing the rankings of the results, it is noticed that the skill of "Decisiveness", indicated as the most important in this study, it is not identified among top skills of older studies. The same thing occurs with the skills of "Practicality" and "Creativity".

This could lead to the assumption that crisis conditions in the construction industry demand for leaders having a more managerial profile rather than an inspirational and motivating profile.

**Table 7.2: Sunnary of critical leadership skills**

| **Alsadey 2013 (personal skills)** | **Alsadey 2013 (professional skills)** | **Ekung (2014)** | **Bhangale(2013)** | **Hyvari (2006)** |
|---|---|---|---|---|
| **Concise** and rational | Versatile | **Effective communication** | **Communication** | Planning/organizing, |
| Specific | Self-regulation | Competence | **Knowedge** | Infroming, |
| Open minded | **Motivation** | Accessibility | Problem solving | Claryfing |
| Dynamic | Procedural | Self-confidence | Confidence | Monitoring |
| Maturity | Receptive to alternative solutions/suggestions | Result oriented | Decision making | Problem Solving |
| Adherence to personal Moral Code | Firm | Adaptability in colaborative leadership styles | Negotiation | Supporting |
| Team player | Broad base visualization | Intelligent | Networking skills | Consulting |
| | | | Goal setting | |

From the third section of this survey, which refers to the companies' tendency to use crisis management tools and techniques and the perception of people involved about such tools, the main assumption retrieved is that a significant percentage of 26,62% don't make use of such tools while a 8,44% rarely uses them. Only a 24,68% uses management tools on a continuous base. The main area where management tools are used is the planning phase of the project. Large companies seem to make use of them a bit more during the realization of the project, while freelancers don't seem to be familiar with them. Furthermore a 32,47% appears to be satisfied with such tools, while a sum of 38,31% is little satisfied or neutral.

Regarding the initial process of identifying possible risks and crisis, "Brainstorming" is far away the most popular technique (88 indications) with "Software tools" (59 indications) and "Process flow charts" (45 indications) coming up next. In a similar study by Thaheem and De Marco (2013), "Documentation Review" and "Brainstorming" were the most popular answers. In this survey "Documentation Review" was ranked fourth. Not important differences were observed between groups.

The ways of communication was especially investigated in this survey, as it has been proven an essential part of the management procedure by all analysts. "E-mail" is the predominant communication tool in the Greek construction companies, while "Meetings" come fourth (4,35) which is quite surprising, as they considered to be

essential in a dynamic process such as a construction project. In a similar survey conducted by Ranong “e-mail” and meetings were the first most frequently used tools.

Finally, the section about what needs to be done in order to enhance management effectiveness under crisis conditions, research revealed as prevailing answers “Eliminating ineffective operational business activities” (100 indications), “Training/Developing human resources” (88 indications), “Training/Developing project managers/leaders” (64 indications) and “Implementation of new crisis management tools/strategies/methods “ (58 indications). Not important differences were observed between groups regarding the “authority level”. The perceptions of respondents seem to converge.

## 7.2 Limitations

The main limitations of this study were sample size, time and space. The sample consisted of 154 managers, engineers and in general people involved in the construction sector. Even though the sample of 154 is not quite large, it is considered representative, as it consists of people with significant educational level able to understand the deeper mining and context of the questions asked. Furthermore the sample covers all company sizes, even though not equally almost all geographical regions, all authority levels and all ages. The time at the disposal of the researcher to conduct the survey was an important limitation as well. More time available could offer the opportunity to increase sample size or even conduct representative interviews. Furthermore, word limitation and specifications were important reasons for not being able to conduct further analysis, present and discuss the results of it.

# 8. Conclusion

The aim of this research is to investigate the impact of economic recession in Greece on leadership and management effectiveness issues in the construction sector. The importance of different factors on management effectiveness was investigated. Apart from the factor “Adequate funds/resources” which was indicated as the most important, special importance is given to the managerial characteristic of project managers. The general belief in the construction sector seems to be that competence

and special abilities of people who are responsible for a project is major asset for them in order to obtain success and effectiveness.

Furthermore, leaders' behaviour under crisis circumstances seems to exhibit a medium performance in all leadership skills with as slightly better performance in Decision making", "Problem Solving" and "Informing/Clarifying" which are actually managerial kills. Likewise an ideal leader has been characterized by the participants as decisive with technical competence and industry knowledge and good communication skills. This result indicates the tendency that exists in construction industry where special attention is given in practical and technical issues rather than in psychological and motivation issues. What is really interesting is that perceptions among different demographic groups differ in terms of project and company features rather than human characteristics.

Concerning crisis management issues, it could be argued that Greek construction companies are not so familiar with it. Large and medium size companies demonstrate a similar degree of use of the tools and significantly higher than that of small size companies and freelancers. However, only a total of 24, 68% use management tools in an ordinary basis, which is quite low concerning the circumstances.

Furthermore, the perceptions about strengthening management effectiveness under economic crisis circumstances depict once again the unfamiliarity of the sector with the concept of crisis management. People in the construction sector are not strongly orientated towards the adoption of crisis management strategies or the development of key people for such situations. Even though special preference is shown in operational efficiency and training of personnel, crisis management philosophy seems to luck of supporters.

It would not be inappropriate to claim that Greek construction industry needs to integrate in an operational level the concepts of crisis management, introduce the most relevant management methods according the needs and expectation of each occasion and apply the most suitable management tools from conception to completion of each project.

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