



PROJECT MANAGEMENT MATURITY MODEL ELOT1429:
AN APPLICATION METHODOLOGY

By

Renold Vasili

A THESIS REPORT

Presented to the Project Management Program in the
School of Management of
City University of Seattle

In Partial Fulfillment of the Requirements
For the Degree of

MASTER OF SCIENCE in PROJECT MANAGEMENT

This Master Thesis was elaborated in the frame of the collaboration of the City University of Seattle and the Graduate Technological Education Institute (T.E.I.) of Piraeus to fully implement at TEI of Piraeus Campus the CU's MS in Project Management Program approved by the Hellenic Ministry of National Education and Religion Affairs as by decision E5/58291 published in the Hellenic Government Gazette (FEK) B/924/5- July-2005.



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To Adriana and Petraq Vasili

Resume

Renold Vasili is an employee of Wellon Group of Companies (WGC). His job title is Project Coordinator and he is responsible for providing operational and technical assistance, as well as training and consultant services to WGC technical management with regards to group's projects needs. He directly reports to the Technical Business Development Director of the Group and has direct communication with technical service and software development staff, lab supervisors, general managers of group and suppliers, customers and payment system administrators. His responsibilities in details are to:

- Assist in ATM and POS installation projects, for both planning and implementation phase.
- Coordinate installation, configuration and operation of pilot devices (ATM - POS) prior to the project implementation phase
- Assist in planning and executing EMV Certification Projects (Visa and MasterCard)
- Monitor and improve operations procedures related to technical departments of group companies
- Analyze critical issues and provide guide lines for applicable solutions
- Assist in acquisition, installation, configuration and making operational ATM and POS third party applications
- Perform purchase orders in Navision ERP system

Abstract

This paper presents the findings of an investigation to evaluate the applicability level of project management maturity model (PMMM) ELOT1429, a Greek standard developed by the Hellenic Standardization Organization (ELOT) and released in 2009. The investigation is performed within a private sector organization that may provide information technology (IT) services as scope of public interest projects in cooperation with government agencies in the context of the 4th European Community Support Framework (CSF). Implicit within the model's description is an idea that project performance improves. However, the existing empirical evidence to understand the comparative effectiveness of ELOT1429 approach in project management is absent and practical application is limited. Moreover, there are a number of key factors addressed by international PMMMs that have to be considered for effectiveness and efficiency in project management. The paper critically evaluates the new standards' assets in contrast to the existing international PMMMs and addresses a number of differences between them in the area of organizational structure, project management methodology, and resource management and performance improvement. A significant knowledge gap that the organization faces derives from the parallelism of ELOT1429 and applied ISO9001. A survey that investigates the organizational culture orientation out of 21 employees revealed a significant gap. The paper concludes by proposing a system approach in adopting the new standard, by addressing the PMMMs' gap analysis, the organizational culture orientation based on organizational culture assessment instrument (OCAI) and the project management knowledge gap

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Project management maturity model ELOT1429: An application methodology

The Greek government will receive the fourth structural assistance budget from the Community Support Framework (CSF), a European Union action for specific countries with low development. This will be the last assistance budget and should have started supporting government projects since 2007 with end year the 2013.

In 2007, the need for higher project success rates has been realized and was mentioned by the government and discussions concluded that there is a need for a national standard that would certify involved organizations in terms of competency in project management. Two years later, in 2009, ELOT1429 was developed and approved. Its implementation is now being evaluated for improvements.

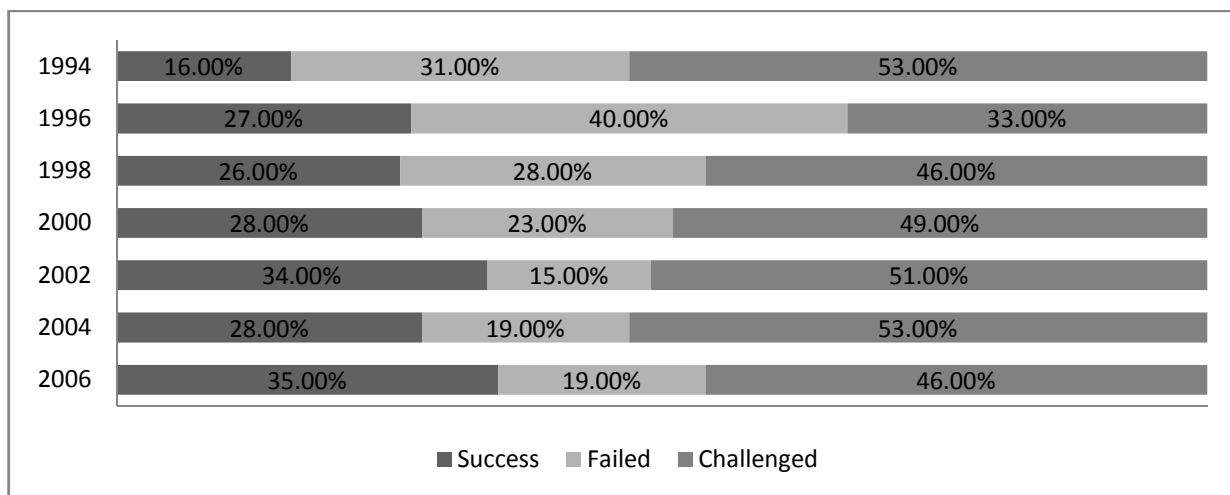


Figure 1: Percentage of project success rates as presented to the Project Management Congress of PMI Greece: Investigating failure to ensure success, a research from the Standish Group

(Johnson, 2008)

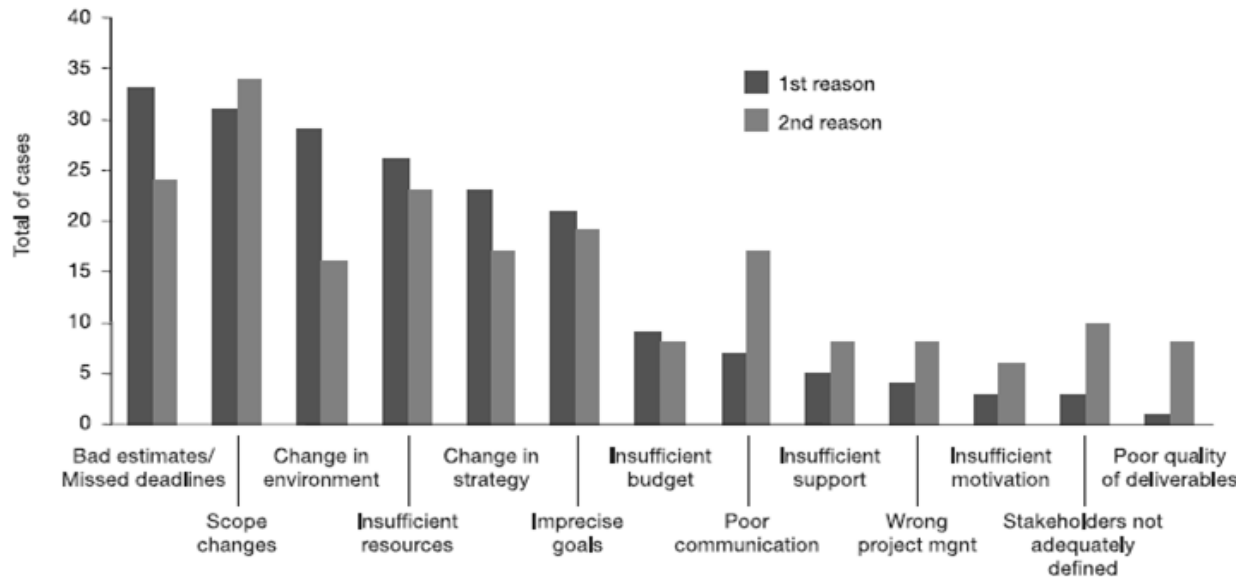


Figure 2: Reasons for project failure

(Nieto-Rodriguez & Evrard, 2004)

According to Giotis (2009), “[previous structural assistance] amount was managed by almost 7,500 companies with final beneficiaries in Greece. As it turned out, most of these Companies did not have the Project Management skills and competency required for managing projects”. The 4th CSF reaches 21.5 billion Euros.

Wellon Group of Companies (WGC) intends to draw funds from the 4th CSF funds by presenting business plans and attending tenders for public interest projects. For this reason, WGC needs to lower the failure rates of projects, create project management methodologies in order to apply them internationally in all eleven countries where group is present and finally perform portfolio management so the projects are carefully selected. In order to achieve such goals, a project management maturity model (PMMM) is to be adopted.

ELOT1429 is a national model developed in 2008 and released in 2009. It is more like an outline rather than a full model comparing to PMMMs developed by international institutes.

Since this model is requested by the government for withdrawing funds regarding public interest projects, it is a regulation that the company has to comply with.

1.1 Purpose of the study

The purpose of this study is to make clear what needs to be done by WGC in order ELOT1429 to be adopted smoothly, as a whole, efficiently and without negative impact to the organizational system. The adoption of a PMMM is about to increase WGC's performance on projects and will enable the group to draw funds originated by the 4th CSF.

1.2 Significance to workplace

I am a Project coordinator at WGC. The group is active for fifteen years in the Greek and EMEA market providing software development services, bank branch equipment and maintenance services, as well as call center services.

WGC needs to be certified according to ELOT1429 as well as adopt aspects and characteristics described by international project management maturity models which do not exist or are not described by ELOT1429. This is the chance of the organization to adopt a PMMM and grow in the market by being more competitive as successful project rates grow.

This study will address the gaps between the ISO9001 procedures and ELOT1429 as well as the gaps of ELOT1429 to OPM3 and P3M3, which are internationally recognized standards.

As a candidate for the position of the project manager that will lead the project management maturity model integration, this study serves my goals and expectations more than any other subject area.

1.3 Relation to the program of study

The project management maturity is one of the most important factors in raising organizations' project success rates. I have discussed the project management maturity topic in classes PM501, PM506, PM511 and PM512. In class PM501 I have been discussing the maturity

as a project management discipline. In the class PM506 I have been studying the people behavior in matured environments, while in class PM511 I connected the maturity with the quality management and finally in class PM512 I have been discussing the customer role in the organizational maturity growth.

“Maturity is an obvious choice for companies looking to increase their ROI in project management, but they need to carefully examine what it takes to get where they want to go” (Wheatley, 2007).

“[Organizational] maturity needs will vary, and there isn’t a ‘one size fits all’ optimum level of maturity that’s appropriate for every organization. For some organizations, progress beyond a given point may be pointless” (Iqbal, 2007).

1.4 Definition of terms

“The Beginning of Wisdom is the Definition of Terms.” (Socrates, 470-399 B.C.).

APMG	Association for project management Group
CCTA	Central computer and telecommunications agency
CMMi	Capability maturity model integration
CSF	Community support framework
ELOT	Hellenic organization of standardization
EMV	EuroPay, MasterCard and Visa
ERP	Enterprise resource planning
ESI	European software institute
IIL	International institute of learning
ISO	International standardization organization
OPM3	Organizational project management maturity model
P2MM	Prince 2 maturity model
PMBok	Project management body of knowledge
PMI	Project management institute
PMMM	Project management maturity model
ROI	Return on investment
SEI	Software engineering institute
SPI	Software process improvement
TQM	Total quality management

Problem Statement

Project Management is a necessity required for business excellence. Thus, it is a business need to raise the organization's maturity in project management, according to a system approach, in order to lower the projects' failure rate with the least negative impact of the applied changes. An option for Project Management Maturity Model selection is ELOT1429, developed by the Hellenic Organization of Standardization in 2008.

2.1 Rationale

Project Management is winning ground day by day. It is an old profession that is being refreshed and updated continuously as it is considered to be one of the main means towards business excellence. The performance in Project Management is strongly related to the experience of implementing projects, which is known as maturity, for both individuals and organizations.

The Greek national standard ELOT1429 «Managerial capability of organizations implementing projects of public interest», has been developed in order to specify the maturity of the organizations that claim government funds for public interest projects and help such organizations to take actions for process improvement. The main goal of the standard is to assure success for public interest projects, which aim to cover the needs of the society in order to raise the quality of life for citizens. ELOT1429, as a standard, is an impulse for the profession and it triggered my interest immediately. Having knowledge of the standard and its implementation methods would help me towards my career development. As an individual, I would improve my project management skills and performance by studying an organizational maturity model that will help me understand what an organization seeks from a project manager.

I would not only use the knowledge for professional concern, rather I could also contribute towards the standard's improvement by submitting findings of my research to the respective National Technical Committee responsible for updates on ELOT1429.

2.2 Objectives

There are two objectives to be extracted from the current research. The first one is to specify the applicability level of the maturity model ELOT1429 for an organization that provides services to financial institutions. The second objective is to build a script that would lead the organization through the implementation of the maturity model in order to have its self-evaluation. Depending on the applicability level, the script will adopt characteristics from international maturity models, showing in parallel the needs of ELOT1429 for improvements. The applicability of the model as well as the script is required as part of the feasibility study needed by the executives to decide the ELOT1429 implementation.

Review of the Literature

The problem this research project is about to address, leads me to review literature related to project management maturity models (PMMMs).

Organization project management is the application of knowledge and skills, tools and techniques over organizational and project activities to achieve the goals through projects (Chui, 2005). The degree to which the application is extended defines the organizational project management maturity (PMM).

Porskrog (2008) states that “according to the CMMi Product Team (2004) organizational maturity is: “The extent to which an organization has explicitly and consistently deployed processes that are documented, managed, measured, controlled, and continually improved” .

The value of PMMMs is well defined by many writers in the last years (Ibbs & Kwak, 2000); (Barkley & Saylor, 2001); (Chui, 2005); (Kerzner, 2006a); (Kerzner, 2006b); (Project Management Institute Inc., 2008); (Pennypacker & Grant, 2003); (Bourne & Tuffley, 2007).

The business excellence requires maturity in managing projects so as the costs are minimized and the performance is maximized, always conforming to specific quality standards. The research over the added value of PMMMs defines the importance of adopting and serving a maturity model in favor of the organization and its customers/clients (Project Management Institute Inc., 2009).

Tuffley (2007) reports that her research for the Carnegie Mellon University shows that organizations who improve their process maturity gain:

1. Improved schedule and budget predictability, cycle time, quality (as measured by defects) and employee morale
2. Increased productivity, customer satisfaction and return on investment (ROI)

3. Decreased cost of quality

Yazici (2009) reports that the research performed back in 2004 by Pricewaterhouse Coopers (PWC) with 200 responders from 30 countries concluded that the greater the PMM of an organization, the greater the positive impact on overall project performance. However, there is no optimum maturity level for every organization (Wheatley, 2007).

Ibbs (2000) states that many organizations are moving towards projectized structures by turning operations to projects and processes in order to plan, to manage and to complete the tasks more successfully. This has been mainly driven by the growing pressure on managers to integrate, plan and control schedule intensive endeavors (Ibbs, 2000).

However most of the organizations perform in an uncertain, perplexed and misdirected approach relating to project management application. The investigation for a set of processes that would provide managers with accurate measuring data of the value of project management process incorporation has been a key objective in the last decade (Ibbs, 2000). The result was the development of PMMMs.

Porskrog (2008) claims that the basis for all PMMMs is the “family capability maturity model (CMM)...developed by the Software Engineering Institute (SEI) of Carnegie-Mellon University”. “CMM’s focus is on continuous performance improvement through maturing processes as they pass through stages from unstable to stable and statistically controlled to improved capability” (Porskrog, 2008).

There are different PMMMs available by international organizations and individual researchers. Some of them are presented in the following table.

Table 1: Project management maturity models (Chui, 2005); (Porskrog, 2008); (Pennypacker & Grant, 2003)

PMMM title	Organization
Capability Maturity Model integration – CMMi	ESI
Lean Capability Maturity Model integration – LCMMi	ESI
Microsoft Solutions Framework for CMMi – MSF4CMMi	MS
Project Framework – PF	ESI
Project Management Maturity Model – PMMM	PMS
PRINCE2 Maturity Model – P2MM	OGC
Project Management Maturity Model – PMMM	PMG
Project Maturity Model – PMM	Interthink
Project Management Maturity Model – PMMM	APMG
Portfolio, Program and Project Management Maturity Model – P3M3	OGC
Project Management Maturity Model – PMMM	Kerzner
Organizational Project Management Maturity Model – OPM3	PMI
Project Management Maturity Model – PMMM	Gareis
Berkley’s Project Management Process Maturity Model - PM ²	Kwan, Ibbs
Unified Project Management Methodology – UPMM	IIL
Project Management Maturity Model – PMMM	PMSolutions
Strategic Project Leadership Maturity Model – SPLMM	Shenhar
Project Maturity Form – PMF	Andersen
Project Management Maturity Model – PMMM	IPSolutions

A new approach coming forth with the lately developed PMMs is that the model and the methodology are generalized across industries, whereas prior to year 2000 most of the PMMMs had specific audiences, some of them still have the same approach like CMMi in the software development industry (Ibbs & Kwak, 2000).

Porskrog (2008) states that the existing PMMMs "...can be grouped into at least four groups, where the most widely discussed are the models grouped into three groups by Cooke-Davies (2005)".

Based on Porskrog (2008) research, Group A consists of those PMMMs that assess the same processes across all levels using a variation of the CMM's maturity stages. Group B consists of those PMMMs that incrementally add processes at each level of maturity, thus they closely follow the principles of CMMs (Porskrog, 2008). Group C consists of those maturity models that incorporate both group A and group B approach at a specific extent. Group D consists of those maturity models that build on the organizational development. There are four dimensions that these maturity models incorporate the strategic, the tactic, the administrative and the operational dimension.

Each level of these dimensions defines the maturity of the organization and set the future goals for improvement. The following table presents the most known PMMMs of both categories.

Table 2: PMMMs' groups and respective models

	Narrow project perspective	Broad organization perspective
A	Berkeley's PM ² & PM Solutions' PMMM	None identified
B	Kerzner's PMMM & Gareis' PMMM	OGC's P3M3
C	None identified	PMI's OPM3
D	Shenhar's SPLMM	Andersen's PMF & IPSolutions' PMMM

For years top managers in organizations of any kind of industry have had doubts relating to the returned value of the investment into project management. Executives request for details that demonstrate the positive relationship between the project management and the influence it has in the organization in terms of financial and organizational benefits.

A five year's study, from 1997 till 2002, performed by professor William Ibbs and Justin Reginato (Ibbs, W. and Reginato, J. 2002; Chui, K. 2009) in quantifying the value of project management over 52 US corporations had the following results:

1. Companies with more mature project management processes and methodologies have higher project performance
 - On time and budget vs. 40% over time and 20% over cost targets
2. PMM is strongly related to the project time and cost estimation
 - 0.08 schedule performance index (SPI) variation and 0.11 cost performance index (CPI) variation of more matured corporations versus 0.16 for both indices for less mature corporations. In an example this finding would be presented as following: the less mature corporation have 1.6 million Euro cost variation.
3. High PMM results in lower direct costs
 - 6-7% vs. 11-20%

Measuring project management ROI “makes it possible for managers to measure potential benefits of projectizing an organization or improving the company’s relative level of project management sophistication” (Ibbs & Kwak, 2000).

Emasoft (2006) has performed a study over calculating PM ROI and thus quantifying the value of project management and defining the relationship of PMM and return on investment.

The study came up with two results:

1. “Over 94% of senior project management professionals say that implementing PM added value to their organizations” (Emasoft, 2006)
2. PMM is strongly related with ROI

- The cost to improve PMM level and the cost performance index (CPI) can be used to calculate project management ROI using profit margins and projected annual revenues (Emasoft, 2006).

The relationship between the PMM and the project management spending and ROI is presented in the figure 1 (Ibbs, W. and Reginato, J. 2002; Chui, K. 2005)

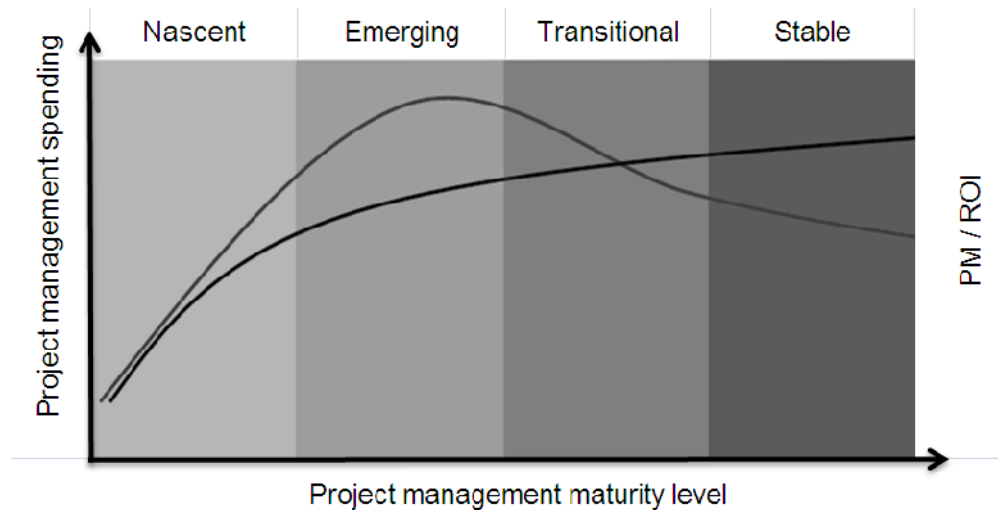


Figure 3: PM spending and ROI in each level of the PMM (Chui, 2005)

PMM passes through measurable phases, according to Ibbs and Reginato (2002) research. These phases are Nascent, Emerging, Transitional and Stable project management. The research has shown that project management spending increases rapidly in the first and the second phase and reduces rapidly in the third and the fourth phase, while project management ROI keeps rising in all four phases.

Model adoption processes are strongly dependant on specific criteria; to name a few, the model target group of organizations, organization size and industry, as well as the level of organization's PMM at the implementation point.

Evaluating an organization's maturity has never been easy. "Although the costs of the implementation and appraisal of capability maturity models is high for the software providers,

there is no formal study investigating whether this investment pays off or, in other words, whether their customers are measurably satisfied with the quality of the service provided” (Santos, Oliveira, & Silva, 2008). However, “continuous quality improvements are associated with better return on investment (ROI) for organizations.” (Subramanian, Jiang, & Klein, 2006).

Nevertheless, it is each individual that needs to adopt the method, believe in it, and be patient and supportive during data collection and accurate during data analysis. Especially Project Managers have to be experienced and have the necessary competency (Project Management Institute Inc., 2007). Also, “the development of technological capabilities results from an extended learning process and external policy agents can play an important role in its development...trends in governmental and non-governmental policy initiatives and the use of concepts such as capability and absorptive capacity, which are positioned within generic-staged models of capability maturity” (Rush, Bessant, & Hobday, 2007).

Knowledge is categorized as explicit or tacit (Nonaka and Takeuchi, 1995; Ajmal, M. M. and Koskinen, K. U. 2008). “Explicit knowledge is to ‘know what’, it can be put into [information technology] and [it is defined as] a digital or discrete process that can be codified and transmitted in formal, systematic language” (Nonaka 1994). “Tacit knowledge is to ‘know how’ [and is found] in one’s experience; hard to replicate and can be transferred indirectly though time consuming socialization processes” (Kaplan et al, 2001; Duffy, 2000).

PMM consists of both, explicit and tacit knowledge. For example the techniques for estimation and the data to be used for processing constitute explicit knowledge that can be transferred through information technology or systematic language. On the other hand, the part of the behavioral competences required by PMM improvement processes are subject to tacit knowledge, thus difficult and time consuming knowledge transfer.

PMMs are not in a position to resolve such difficulties thus they are limited to the tacit knowledge transfer processes. It is here where organizational maturity models can provide the system with the necessary best practices in terms of organizational culture assessment and management, in order the organization to achieve successful and early tacit knowledge transfer for the needs of maturity rising.

One of the most known organizational culture assessment tools is the organizational culture assessment instrument (OCAI) developed by Cameron and Quinn (1999). This tool is used to determine the culture of the organization and the ways through which the culture change may be achieved for improvement. The tool introduces two dimensions based on which the culture is determined by the levels of four quadrates that represent four different culture types. The dimensions differentiate the following criteria upon which the effectiveness of the organization relies:

1. Those that emphasize flexibility, discretion and dynamism from those that emphasize stability, order and control
2. Those that emphasize internal orientation, integrity and unity from those that emphasize external orientation, differentiation and rivalry

Yazici (2009) reports that "Cameron and Quinn (1999) define these four quadrants as: clan, adhocracy, hierarchy and market. The clan culture stresses the importance of participation, commitment, and high morale, while the adhocracy culture assumes that innovation and initiative lead to success and encourage entrepreneurial. The hierarchical culture is characterized by a structured workplace with formal rules and policies. The market culture perceives the external environment for the organization to be both results- and production-oriented."

Doolen (et al. 2003) states that an organizational culture, which supports the communication and the cooperation between the team members, is strongly related to the team leader's effectiveness and the team satisfaction level.

Yazici (2009) performed a research among 86 project managers from different service and manufacturing organizations in order to find out the relationship of the organizational culture and the PMM. The results have shown that the majority of the organizations had a market-oriented culture and the emphasis is on getting the job done and winning. Project professionals have perceived the PMM as an enabler to competitiveness. Moreover, organizations with clan-oriented culture have high project successful rates along with high team member satisfaction levels. This means that more recognition for team members, more horizontal communication and more cross functional team work have high positive influence on projects' success and organizational competitiveness.

For the reasons that the importance of the culture assessment indicates, OCAI will be used in order to determine the current organizational culture in WGC. The results will lead in setting future targets for culture change and will influence the application methodology development.

These studies and finding demonstrate that there is a lot of room for further research, innovative approach experiments and intensive application of methodologies developed as a result of new findings because, after all, "we are what we repeatedly do, then excellence is not an act, but a habit (Aristotle 384 BC - 322 BC)".

Two evolving PMMMs, which are internationally recognized, are the OPM3, which is developed and published by PMI, and the P3M3, which is developed and published by OGC.

OPM3 is developed by PMI which is an organization founded in 1969. “In 1998, PMI and a team of 800 volunteers set out to develop its own PMMM, OPM3. The result is broad by design, cutting across organizations no matter their size or industry. After years of research and development, OPM3 was first published in 2003” (Jed, 2005).

OPM3 is based on the PMBOK Guide 4th edition, the standard for programme management and the standard for portfolio management. All three standards are released in 2008 from PMI and they incorporate global approach to project, programme and portfolio management concepts (PMI Today, 2008). OPM3 provides an online tool enabling the organizations to make the self-assessment and take full advantage of the standard.

The PMI standard OPM3 is developed in accordance to government projects standards developed and published by PMI. “Many more governments and government agencies are starting to see the importance of project management as they take on the daunting task to meeting the needs of fast growing economies in an increasingly competitive world” (PMI Today 2008). “If applicants for EU funding have to demonstrate that their project coordinators have good project management competencies, the EU’s programs are likely to be more efficient and successful” (Moore, 2008). The UK’s national school of government ran a pilot training over PMI credentials.

“The portfolio, programme and project management maturity model (P3M3) is a reference guide for structured best practice. It breaks down the broad disciplines of portfolio, programme and project management into a hierarchy of key process areas (KPA’s)” (Murray, 2006).

P3M3 is developed by the Office of Government Commerce (OGC), a department within the UK Government. The goal and purpose of OGC is to help public sector organizations

improve their efficiency, gain better value for money and deliver improved success from programs and projects.

Murray (2006) states that P3M3 does not recognize only the project management maturity level of an organization, it also take into consideration the activities that build and maintain a program and the activities that select and prioritize the projects and programs to be carried out.

“The recent Review of the Australian government’s use of information and communication technology (ICT) by Sir Peter Gershon contains specific recommendations for improving ICT delivery capability, including strengthening agency governance and, more specifically; improving agency delivery capability. As part of the response to this report, the federal government has stated that they "are less likely to approve funding for projects where agencies are not able to demonstrate a corresponding capability” (Wells, 2010).

David Wells (2010) states that the Australian Government has selected P3M3 as model based on which federal agencies will have to comply by assessing project, program and portfolio maturity and reporting the level, as well as setting target improvement for higher maturity.

P3M3 is based on the project best practice guidance Prince2, the Managing Successful Programs (MSP) guidance and the Portfolio, Program and Project (P3O) guidance, all developed and published by OGC.

The PMI (2009) study, "Researching the Value of Project Management" concluded, "[Business] value appears to increase in proportion to the maturity level of the project management implementation that is encountered. In particular, greater levels of intangible value were reported in organizations that have a higher level of maturity." Earlier, the findings from the study "Measuring the Strategic Value of Project Management" carried out from the

University of California, Berkeley; found that "higher levels of PM maturity are found to be associated with better cost and schedule results, on average. Critically important, they are also associated with more predictable results."

Recently, in 2008, the Greek National Standardization Organization (ELOT), which is a registered member of ISO, has published the Greek National Standard for PMM. It is been published with the reference name ELOT1429 and its title is "Managerial capability of organizations implementing projects of public interest".

Due to the fact that the ELOT1429 is a quite new standard, developed and released in 2008, there is no available literature in terms of research papers or reviews except few conference presentation papers. This is an obstacle on identifying the reaction of individuals and organizations over the adoption of the standard. However, conference, congress and related published material will be used during the research in order to reflect the feedback on the ELOT1429 (Giotis, 2009).

ELOT1429 has many drawbacks, such as no link to internationally recognized certificates or no reference to best practices in the area of project management. For this reason, project management effectiveness, according to Pantouvakis (2009), is beyond the strict managerial competency. ELOT1429 does not address the behavioral and contextual aspects that project management discipline requires for effectiveness.

On "14th of April 2008, ELOT released the draft version of the standard under development (Giotis 2008). Giotis (2008) provides a translation of the ELOT1429 standard in: "Administrative Sufficiency of Organizations for Implementing Projects of Public Interest".

Chiotis, (2009) states that the standard is currently released and organizations may apply for the official audit. The committee of the audit group consists of members from ELOT and few

governmental organizations. Companies that would like to have a share of the community support framework funds have to apply and deliver business plan proposals till 30 September 2010. The application requirements include the ELOT1429 certification of the organization, while from January 2011 funds will be released and the processes described by the standard will be applied practically from that date. The standard then will show if it will achieve its goal and help on transparency and successful project implementation (Chiotis, 2009).

3 , a consultant company that provides support and training to organizations relating to standards, states that ELOT1429 can be incorporated by or can incorporate other established managerial system standards like ISO9001.

Stanleigh (2009) states that ISO standards that define project quality, establish the processes to ensure that project management processes:

- state and imply the needs of customers are understood and met
- stakeholders needs are understood and evaluated
- incorporate the organization's quality policy

ISO9001 defines the organizational structure, the resource management, the performance evaluation and improvement as well as the project methodologies for quality assurance. Based on the widely available information about ISO9001 and on the guide of ELOT1429, the differences will be drawn and later evaluated as per the aspects that Stanleigh (2009) defines as the goal of ISO standards in terms of project management quality assurance.

ISO9001 procedures and processes are considered as the current and established knowledge of WGC with regards to the project management processes only which is what the organization 'can' do. Other areas of quality assurance, such as the area of financial management, although it is a large part of the organization and thus related tightly to the project,

program and portfolio management, it is one of the subjects that fall outside of the needs for the development of this research and for what it has been initiated for. ELOT1429 is the maturity model that needs to be adapted and thus it defines the knowledge that the organization needs to possess, which defines the procedures and processes of project management that WGC 'must' establish. Since ISO9001 covers part of the project management body of knowledge, we will define which parts of ELOT1429 and at which extent they should be established. The gap analysis model that will be used is the one presented by Zack (1999).

Zack (1999) states that "the gap between what the organizations must do and what it actually is doing represents the strategic gap which is a potential knowledge gap. That is, given a gap between what organization must do and what it can do, there may also be a gap between what the organization must know and what it does know." Zack (1999) continues by assuming that "based on a strategic knowledge an organization can identify the extent to which its existing knowledge is in alignment with its strategic requirements. The result is a set of potential knowledge gaps. In some cases, an organization might know more than needed to support its competitive position."

As I reported above in this chapter, ELOT1429 has been developed quickly, without the necessary time to mature and not based on internationally recognized PMMMs, as we may identify by referring to the reported references in the ELOT1429 guide. Due to the fact that a bad beginning makes a bad ending (Euripides), I will suggest through this research project that WGC should adopt ELOT1429 with a set of enhancements that will be generated based on a gap analysis between ELOT1429, OPM3 and P3M3. The gap analysis is based on the model presented in a research performed by Togaf (the open group, 2006) and its objective is to

highlight the aspects that ELOT1429 does not incorporate or poorly incorporate according to both OPM3 and P3M3.

In this paper, as a result of the research based on the literature described earlier in this chapter, I will introduce an application methodology described as a set of key practices that need to be applied for the adoption of ELOT1429 tailored for WGC and including the most important enhancement that international standards incorporate.

This research has been design with a system approach in order to provide a solution that addresses the most important aspects of the system and takes into consideration the international knowledge about PMMMs.

The main sources of information are relating to ELOT1429 standard and its implementation guides, the ISO 9001 procedures of WGC and, OPM3 and P3M3 standards which are internationally recognized as good practices.

Methodology and procedures used in the study

The methodology that will be used for this research project is process based. Each process has inputs, which will be processed through specific tools, resulting in respective outputs that make up the objectives, described in earlier chapter.

I will reach the goal by applying two gap analysis models for different data types, and a survey within the organization. Each gap analysis makes up a process, as well as the survey.

The applicability level of ELOT1429 will be defined according to needs of an organization that provides services to financial institutions. Based on the results of the gap analysis models and the survey I will conduct a process based flowchart that will be the basis for the adoption of ELOT1429 by WGC.

The methodology will be described as a process based model. It consists of four processes:

1. Applicability level definition (ALD)
 - ISO9001 and ELOT1429 gap analysis
2. Organizational culture assessment (OCA)
 - Usage of the Organizational Culture Assessment Instrument
3. Project management maturity models' analysis (PMMMA)
 - PMMMs and ELOT1429 gap analysis
4. Application methodology development (AMD)
 - Evaluation of ALD, OCA and PMMMA for application methodology development

The research methodology model is presented in the following illustration.

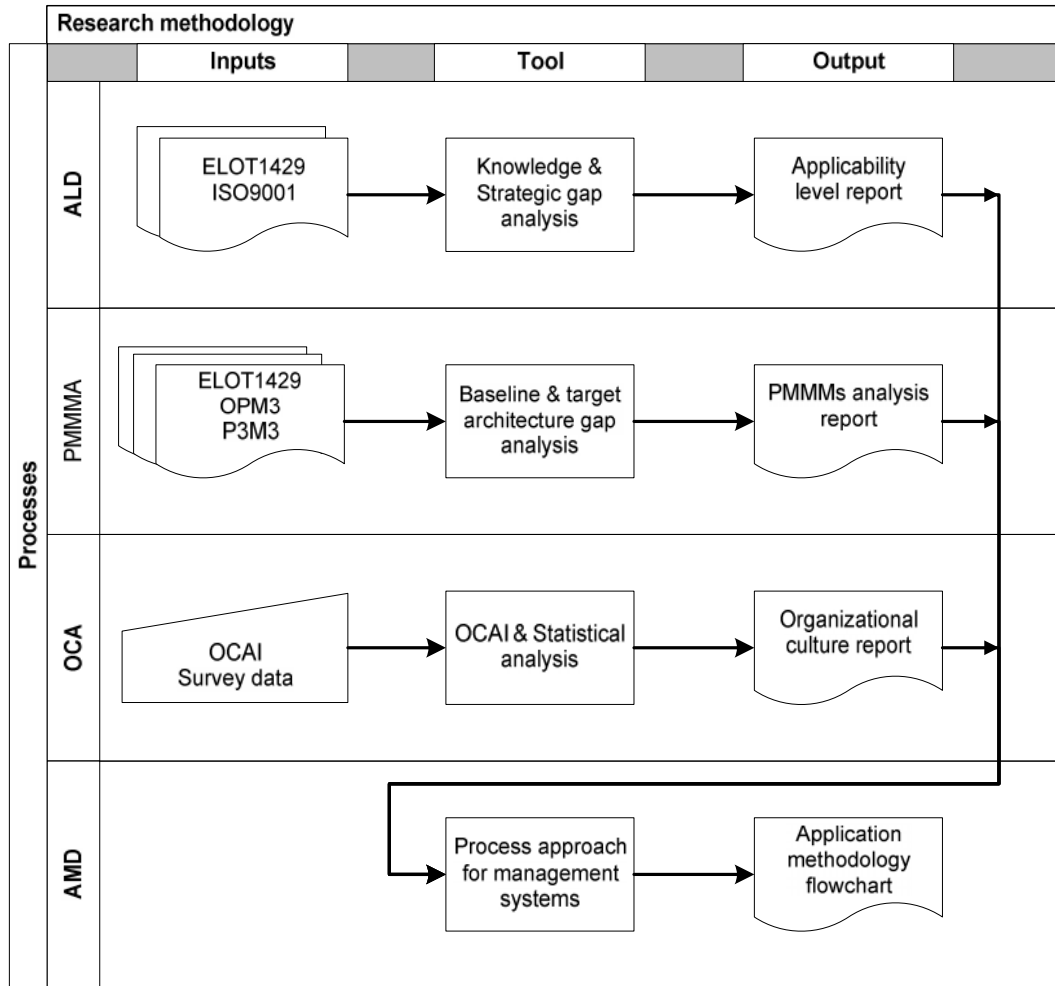


Figure 4: Research methodology model

4.1 Applicability level definition

ELOT’s technical committee TC95, that has developed the standard ELOT1429, has issued three guides of standard’s implementation for different industries. One of them is ELOT1431-2, A Guide for the application of ELOT1429 for organizations implementing public supply contracts and public service contracts. Based on this guide, I will define the applicability of ELOT1429 for WGC in four levels by comparing and analyzing through a gap analysis the current project management system of WGC, which consists of the ISO9001 processes, to that proposed by ELOT1429.

The first level relates to the organization's structure, the second level relates to the enterprise's resource management processes, the third level relates to the performance improvement management processes and the fourth level relates to the project management methodology. The gap analysis will define most of the processes that need to be integrated as well as the processes that need to be altered in order to successfully adopt ELOT1429.

The main aspects, based on which ELOT1429 has been structured, are the following:

1. Management and organization
2. Project management methodology
3. Resource management
4. Results evaluation and performance improvement

The inputs of the Applicability level definition process are the following:

- ISO9001 documentation of WGC
- ELOT1429 standard
- ELOT1431-2 application guide

The tool that will be used is a gap analysis model that will be applied for each of the four levels which both ELOT1429 and ISO9001 are supposed to cover. The model is known as the knowledge and strategic gap analysis model developed by Zack (1999).

The process will address four questions for each of the levels:

- What does WGC know from ISO9001?
- What can WGC do based on ISO9001?
- What must WGC do, based on ELOT1429?
- What must WGC know about ELOT1429, to achieve the goal?

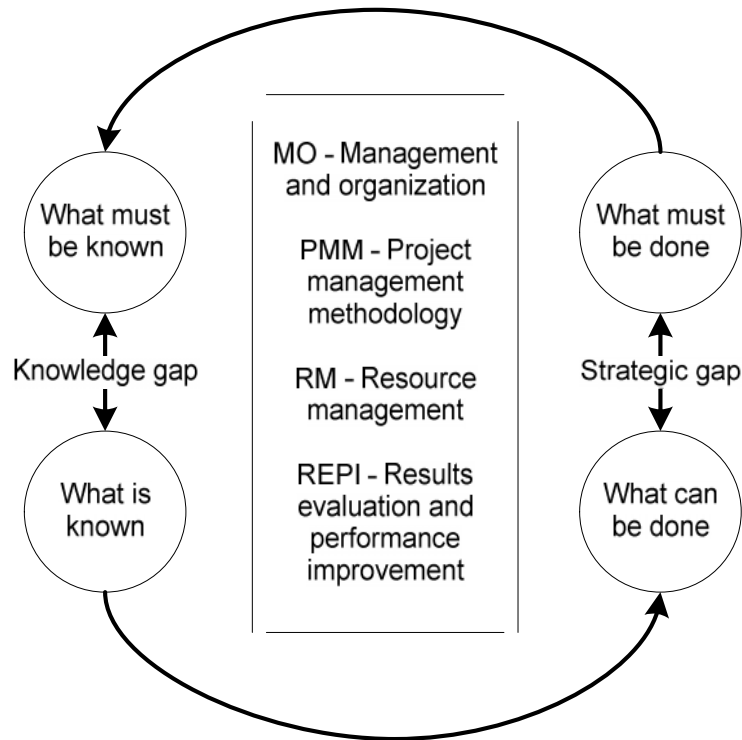


Figure 5: Knowledge and Strategic Gap Analysis

The output of the process is the identification of the gap between the optimized allocation and integration of the inputs, and the current allocation. The optimized allocation is considered to be the situation where project management maturity is defined by ELOT1429, adopted through the application methodology which is the main objective of the present research project, on the other hand, the current allocation is considered to be the situation where project management maturity is defined by the ISO9001 standard implementation of WGC.

The gap analysis will result in a report defining the knowledge gap, which is based on what the company knows and what the company must know, and the strategic gap, which is based on what the company can do with the current knowledge and what it must do to achieve the strategic goal.

4.2 Organizational culture definition

Organizational culture definition process makes use of the organizational culture assessment instrument (OCAI) developed by Cameron and Quinn in 1999 (Yazici, 2009). The organizational culture definition through OCAI is enhanced because the introduction of new procedures in the project lifecycle is tightly connected to the human resource cohesion, the marketing strategy, the hierarchy levels and the innovation strategy, which are the indicators studied by the instrument. The culture is tightly related to the opinion of the people of the organization with regards to the organizational goals.

The input of the organizational culture definition process consists of a set of questionnaires that will be collected through a survey. Participants of the survey are employees of all hierarchy levels within WGC.

The questionnaire is presented in

Appendix A. It consists of two parts, the demographic questions and the organizational culture questions. The demographic questions study five indicators, the years of service in the organization, the current position, the sex, the age and the number of subordinates reporting directly to the participant. The organizational culture survey consists of six categories with four questions each.

- Dominant organizational characteristics
- Leadership style
- Management of employees
- Organizational glue
- Strategic emphasis
- Criteria for success

According to Cameron and Quinn (1999), the culture types are named as Clan, Adhocracy, Market and Hierarchy. Participants should split one hundred points among four questions. The first question of each category is defined as type-A question, indicating the Clan culture. The second question is defined as type B and indicates the Adhocracy culture. The third question of each category is defined as type C and indicates the Market culture. The fourth question is defined as type D and indicates the Hierarchy culture.

According to Yazici (2009), OCAI is used to identify the organization's culture and is helpful for determining strategy for culture change. OCAI is based on a theoretical model called Competing Values Framework (CVF) and has been used by several researchers in order to define the organizational compatibility (Berrio, 2003; Ritchie & Eastwood, 2005; Zeitz et. al, 1997). Yazici (2009) specifies that OCAI is described by two dimensions which organize the major indicator into four clusters. The first dimension differentiates effectiveness criteria which

emphasize the flexibility, the discretion and the dynamisms from the criteria which emphasize the stability, the order and the control. The second dimension differentiates effectiveness criteria which emphasize the internal orientation, the integration and the unity from the criteria which emphasize the external orientation, the differentiation and the rivalry. All these indicators define what people value for the organization's performance.

Statistical analysis will be used over the data gathered through the questionnaires and results will be presented in text, tables and charts.

The output of the organizational culture definition process is the identification of the four OCAI indicators, which specify the organizational culture, and set the basis for the definition of the ELOT1429 applicability level.

4.3 Project management maturity models' analysis

Project management maturity models' gap analysis process inputs consist of ELOT1429, Organizational Project Management Maturity Model (OPM3) developed by PMI and Project, Program and Portfolio Management Maturity Model (P3M3) developed by OGC.

The gap analysis model will be based on the target and baseline maturity models. The baseline model will describe the assets of ELOT1429 while the target model will show the assets of OPM3/P3M3. The process of performing the gap analysis starts with the drawing up of a matrix with all the 'comparing factors/assets' of ELOT1429 on the vertical axis and OPM3/P3M3 on the horizontal axis. Then I will add a final column to the baseline model axis naming it 'added assets' and a final row to the target model axis naming it 'eliminated assets'. Then the population of the matrix will take place based on the comparison of the models based on listed factors/aspects that will be developed during the process PMMMA (Figure 4: Research methodology model). For each assets that is found in both baseline and target models there will be a note 'included'. For target model assets not matching in baseline model there will be a note

that defines if the added asset is optional or mandatory in the 'added assets' column. For baseline model assets not matching the target model there will be a note for eliminated asset if it is highlighted as optional in the baseline model.

The output of this process consists of eliminated assets of baseline model (ELOT1429) and added assets of target model (OPM3/P3M3). The eliminated assets will be drawn in order to show the ELOT1429 optional assets that the target model does not incorporate. The bottom line will draw the gaps which will show the assets of the international standards that have not been incorporated into ELOT1429. The result of this gap analysis will show what is missing from ELOT1429 leading to suggestions for improvements, which is one of the objectives of this research project.

Table 3: Target and baseline maturity model gap analysis template

	Baseline	Target		Added assets
	maturity model	maturity models		
	ELOT1429	OPM3	P3M3	
Asset 1				
Asset 2				
⋮				
Asset n				
Totals of assets to be integrated or changed in ELOT1429		x	y	

4.4 Application methodology development

The application methodology process is the core process of this research methodology.

The inputs of this process consist of the previous processes' outputs:

- Applicability level report
- Project management maturity models' analysis report
- Organizational culture report

The tool that will be used for processing these inputs is based on the process approach for management systems as introduced by ISO. The purpose of the process approach is to enhance effectiveness and efficiency of the application methodology in achieving its defined objectives.

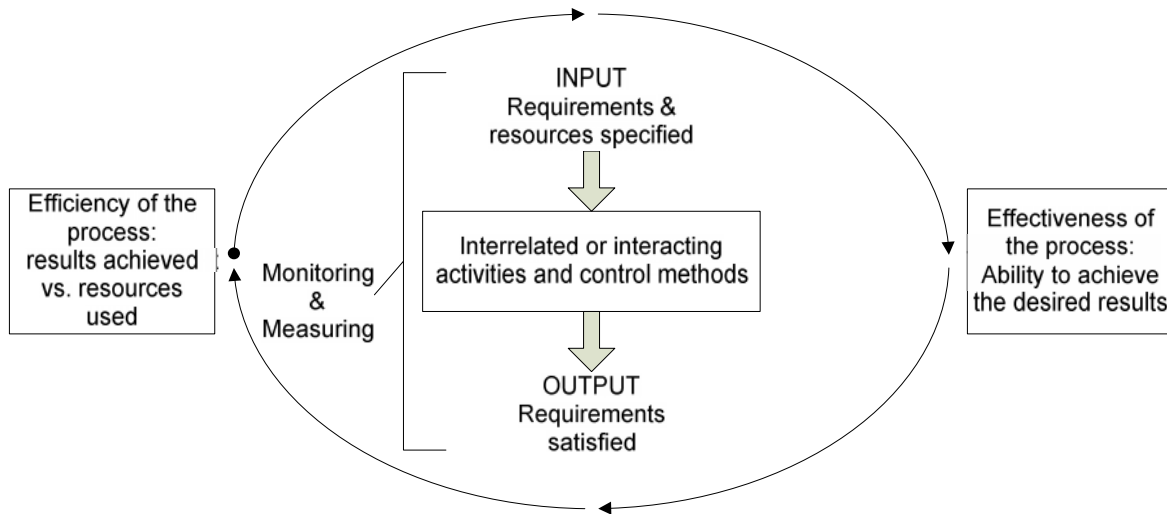


Figure 6: Process approach for management systems (ISO, 2009)

The output of the application methodology process will be a flowchart which defines the processes and their interrelationships that make up the application methodology, through which the organization can adopt ELOT1429 with enhancements from international project management maturity models and tailored as per the organizational culture constraints.

Results

5.1 Applicability level definition

As described in the methodology section, the tool that will be used for the applicability level definition is the knowledge and strategic gap analysis.

5.1.1 Management and organization

The factors that will be reviewed for their existence in the ISO9001 management system (MS) of WGC are the following:

- Management commitment
- Organizational structure
- Legislation review and compliance
- Management's MS representative
- Project manager and project team
- Communication
- Management system review and planning for improvements
- Portfolio management

1. What is known

In this section of the gap analysis will be presented what WGC knows about the MS implementation with regards to the above factors. The current implementation and its spreading level will be defined in a later stage where will be defined what the organization can do with the current knowledge. The information in this section has been drawn from WGC's implementation guide for the ISO9001 MS establishment. It is considered that the organization own this part of the knowledge since the guide has been studied by the responsible for the MS implementation person.

Management commitment: To adopt a management system (MS), a strategic decision must be taken by the organization's top management, while they must demonstrate commitment and continual improvement to the MS. The following topics are considered crucial to the management commitment demonstration:

- Communicating the importance of meeting customer and any regulatory requirements
- Publishing the quality policy
- Ensuring that quality objectives are established
- Performing management review
- Providing appropriate resources

Top management is defined as the person(s) who direct an organization at the highest level. The important message that management must get across is that the objective of this business is to have the customer satisfied. More specifically, management must communicate the MS ideas with regards to organizations and project goals to the employees who must be aware of their own roles and responsibilities as they are defined in the MS documentation.

Organizational structure: The organizational structure defines the hierarchy of the organization. The structure defines who is subjected to whom and who reports to whom. The first step in documenting the MS is defining the structure as it relates to the working processes. A general example of an organizational structure is defined in the following figure. Any person in the organization must have a job description. Everyone is dealing with part of the job necessary for creating the product or providing the service, no matter if it is a production worker or the CEO. A job description specifies what the worker does daily, organizes the list of responsibilities and defines the authorities, if any.

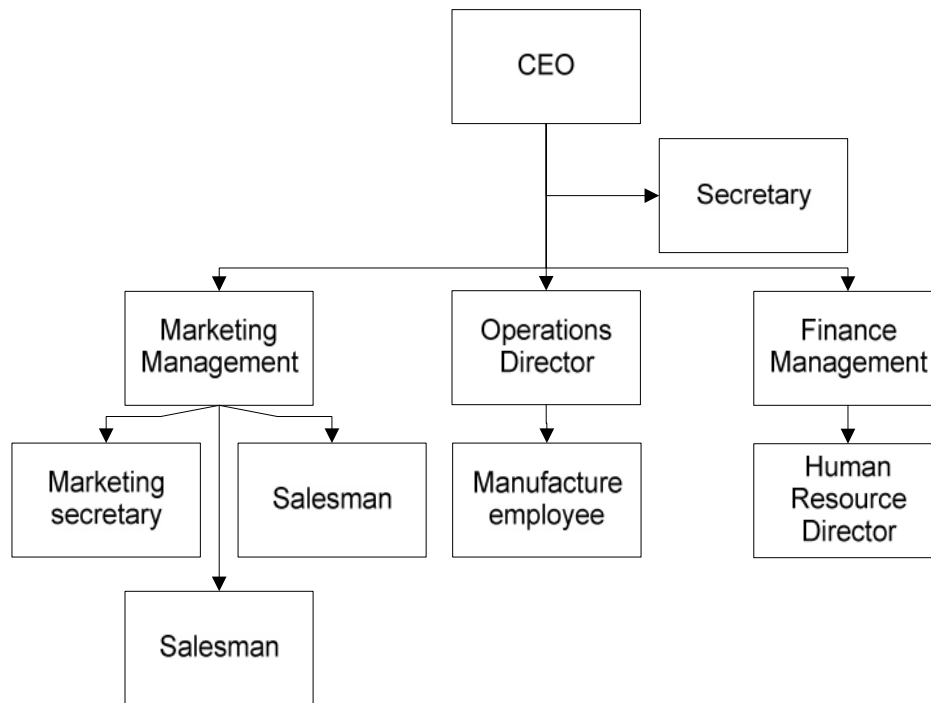


Figure 7: ISO9001 sample organizational structure

Legislation review and compliance: There are no guidelines originated from ISO9001 that refer to documentation or processes related to the legislation or the laws that need to be regularly reviewed for changes.

Management's MS representative: A member of the organization's management must be appointed to oversee the MS with a high level of authority.

Project manager and project team: Project manager and project team necessity are not discussed in the ISO9001 implementation guide with exception that job descriptions' definitions must be in place for every employee.

Communication: The organization must make sure that there exist all those necessary mechanisms that ensure the MS is communicated to all employees and it is discussed among them. The organization should support internal communication in any level ensuring that that

appropriate communication processes are established within the organization and that internal communication occurs throughout the organization.

Management system review and planning for improvements: The organization must review the management system (MS) by carrying out reviews at planned intervals as well as evaluate the results and generate improvement opportunities. It is important in addition to assess the need for making changes and maintain a record of the management reviews. The organization must examine the available information about the MS (inputs) and generate management review decisions and actions (outputs) to improve its performance, to change general quality orientations and to address resource needs.

Portfolio management: There is no portfolio management topic in the WGC's ISO9001 guidelines.

2. What can be done

Management commitment: The organization's top management is committed to enable and maintain the management system (MS) as specified in the ISO9001 documentation. This means that the necessities for management commitment for a MS to success its goals are well known and documented.

Organizational structure: The organization has documented the organizational structure and the role descriptions for the top management and partially for mid management positions. The current organizational structure is presented in the following figure. The organization has a matrix form with emphasis to functional management vertical lines and business units' horizontal line. Business unit managers report to operations' director. This organization structure is based on ISO9001 recommendations; however it has been extended and modified in order to provide matrix abilities.

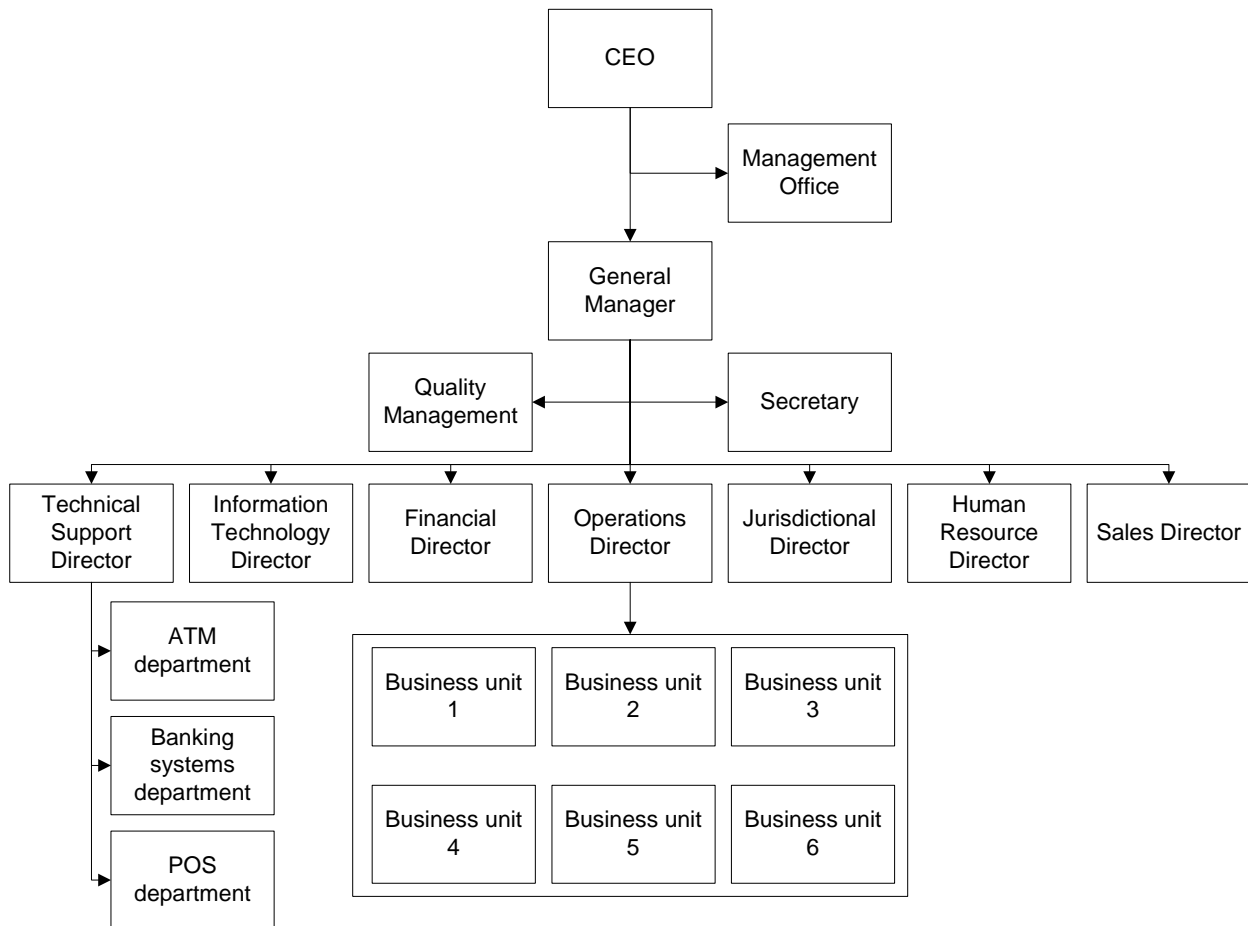


Figure 8: WGC current organization structure

Legislation review and compliance: Although there is no reference of the ISO9001 guide to the jurisdictional management necessities and relative processes, WGC has established a jurisdictional department since the early days of the organization due to the fact that contracts and SLAs have been created and maintained under strict environment, standards and regulations. The jurisdictional department's role is to review the processes of the organization in terms of law compliance and risk management, while in the same time the following up to new or changed laws is guaranteed.

Management's MS representative: MS developments and maintenance tasks fall into the responsibilities of the quality manager. This role is well defined in WGC and the authority that

the role owns is quite high. This responsibility is defined in extent in the MS documentation and the role must report directly to CEO.

Project manager and project team: WGC has created forms for project planning and project management assignment. These forms are in the level of a project charter. There are no project team guidelines that would direct through team members selection. On the other hand there has been established a set of forms and processes for employees evaluation. But it is not supported by an award and motivation system.

Communication: The organization has documented how the communication with the customer should be performed. There are forms for complains declaration. the organizations has developed and maintained an intranet system that mainly consists of shared servers and folders where the information is not easy to be found if the direct path to the files is not know in advance. In the MS documentation it has been clearly defined that its content is available to all or any of the employees. Every part of the MS has been covered by forms, templates and communication directions, for example the SLA monitoring and controlling forms or the escalation report template. Also, there has been established a process for the announcement and the management of calls that clients raise for support issues on their installed systems that are subject to WGC contracts. There has been developed a well described system with regards to approvals for offers, projects, cooperation, procurements, hiring personal, SLAs, budgets or any other approval required for normal operation or business development. It is scaled in terms of hierarchy and budget levels.

Management system review and planning for improvements: There are processes established and maintained with description but they lack guidance and directions for implementation.

Portfolio management: There is no portfolio management in terms of current WGC MS's documentation, processes or procedures.

3. What must be done

In this part of the gap analysis will be presented and defined clearly what must be done according to ELOT1429 except the parts that are currently done by WGC based on the ISO9001 and the current knowledge. This section, thus, represent the strategic gap of the ELOT1429 implementation for WGC.

Management commitment: the desired level of the management's commitment is defined by the satisfactory level of the definition of the goals of the organization and the justification of the new MS, as well as the communication of these factors to the employees. Also, the established motivation and awarding system will play a crucial role in the achievement of goals for each individual involved into projects or for each project team.

Organizational structure: The organization must establish a process that will define the competency levels of its employees on the project's selection methods, planning techniques, execution techniques, monitoring and controlling techniques, closing and delivering activities, financial management techniques and procurement activities, wherever it is needed. For example the executive role is subject to be evaluated on project selection methods but not on planning techniques. Another aspect that the organization has to cover is the one of the roles and responsibilities for all employees and not only for the top management positions. There must be established a process that will define the roles and responsibilities as well as the authority level in terms of access to data and details for each project's phase. Also, the roles and responsibilities of business unit departments and functional management departments, as well as those of project management teams have to be defined and interrelations have to be clearly depicted.

Additionally, a process, through which the population of project teams will be performed effectively and efficiently, has to be developed.

Legislation review and compliance: Especially for ELOT1429, which is a standard required by the government for the certification of organizations' competency in project management in order these organizations to withdraw funds from the European Union community framework of the scheduled period 2007 – 2013, it is necessary for WGC to develop and maintain a process that will monitor the relative legislation and result in action suggesting changes in the system for the adoption of the new regulations. Additionally the organization must establish an archiving system for the relative legislation and plan for liability cover. The access to relative web sites and archives for monitoring the legislation changes is strongly recommended.

Management's MS representative: The organization must have a representative for the new MS. It could be the current representative or a new one with project management competency that would take the organization's project management maturity level ahead or establish the necessary environment and initiate the actions for a project management office (PMO) establishment in the near future. The roles and responsibilities of the management's representative with regards to the MS must be established and documented within the main document of the MS.

Project manager and project team: The organization must develop the necessary documentation that will serve the process of project team member as well, not only the project manager. Also, the organization must demonstrate centralized project management in the form of program and portfolio management for higher effectiveness and efficiency.

Communication: The organization must establish internal, for example meeting minutes recording or status reports, and external communication, including for example clients and government agencies, policy. The policy must be developed in such way that efficiently supports the interrelations of the communication activities and the project information during each phase of the project. The communication management should consist, but not limited to, the tools, methods, techniques, templates and channels definitions and descriptions in depth. Additionally, a centralized communication channel for the portfolio of projects must be established.

Management system review and planning for improvements: The processes that are in place currently for the ISO9001 MS have to be replicated for ELOT1429 by mirroring the necessary and MS-specific factors which are subject to review and continuous improvement.

Portfolio management: Based on the business plans of the organization, there must be developed a process for the annual portfolio management in terms of monitoring and controlling which projects needs to be selected and initiated, boosted or terminated. The deviations from the baselines must be reported as a result of this process.

4. What must be known

In this section will be presented the knowledge that is missing from the organization based on what the organization must do for achieving the strategic goals. Thus, this section depicts the knowledge gap that has to be filled for the realization of the strategic gap.

Management commitment:

- Motivation and award system

Organizational structure:

- Roles and responsibilities assignment methodologies
- Human resource competency (in PM) definition methodology

- Team building techniques

Legislation review and compliance:

- Sources for monitoring ELOT1429-related legislation changes

Management's MS representative:

- Project manager competency framework

Project manager and project team

- Team building techniques

- Project management office practices

Communication:

- Project, program and portfolio communication management methodologies

Management system review and planning for improvements:

- There is no main subject related to knowledge gap

Portfolio management:

- Business, project and portfolio management alignment methodologies

5.1.2 Project Management Methodology

The project management methodology may be tailored in terms of processes used and the extent of that usage in terms of details and repetition. This section covers all subjects that need to be covered by processes' and descriptive documentation's development.

Subjects' list:

- Initiating
 - Define requirements
 - Prepare the environment
- Planning

- Organize and estimate resources
- Define control functions
- Develop the schedule
- Define performance indexes
- Perform risk management
- Executing
 - Implement planned activities
 - Perform procurement management
 - Plan and conduct procurements
 - Administer procurements
 - Manage disputes
 - Sign contract and close procurements
- Monitoring and controlling
 - Monitor and control quality, and certify deliverables
 - Deliver products and/or services
 - Monitor and control communications, and report on progress
 - Manage change requests
 - Monitor and control financials
 - Monitor and control the budget
 - Monitor and control the cash flow
- Closing

1. What is known

According to ISO9001 guide lines, the organization knows that the requirements have to be realized by controlling the following factors:

- product or service realization planning
- customer related processes
- product or service design and development
- purchase and purchasing product or service
- production and service provision
- monitoring and measuring of equipments

The processes that will implement the controls are part of the project management methodology.

According to ELOT1429, the project management implementation part of the guide is divided in specific subjects. These subjects are presented earlier in this chapter. In order to provide a specific answer about what is known by the organization in terms of project management implementation based on the ISO9001 guidelines, the ISO9001 subjects to be controlled will be presented in the following table as broken down and assigned to ELOT1429 respective project phases.

Table 4: ISO9001 and ELOT1429 project implementation process interrelations

	Initiating	Planning	Executing	Monitoring and controlling	Closing
Product realization planning processes	Establish a product realization planning process	Prepare planning outputs	Develop processes to realize products		
Customer related processes	Identify the organizations unique product or service requirements	Review customers' product requirements	Maintain a record of product requirement reviews	Control changes in customers' product requirements	
		Establish customer communication arrangements	Implement customer communication arrangements		
Product or service design and development processes		Plan the design and development of the product or service	Generate design and development outputs	Control the design and development of the product or services	
		Identify design and development inputs	Identify, record, review, verify, validate and approve design and development change	Verify and approve design and development outputs before formal release	
				Carry out design and development reviews	

				Conduct design and development validations	
Purchasing and purchased products		Establish criteria that can be used to control suppliers	Evaluate and select suppliers' ability to supply products that meet requirements	Ensure that purchased products meet specified purchase requirements	
		Describe purchasing requirements	Establish and Implement product verification or inspection methods	Ensure that purchasing requirements are adequately specified	
Production and service provision		Establish a unique identity of organization's products	Carry out production and service provisions	Validate production and service provision processes	
			Identify, verify, protect, and safeguard the property of the customer	Identify the monitoring and measurement status of organization's products	
				Preserve products and services	

Monitoring and measuring equipment		Identify organization's monitoring and measuring needs and requirements	Select, establish, calibrate and protect the monitoring and measuring equipment	Confirm that the monitoring and measuring equipment can perform effectively and efficiently by satisfying the set requirements	
				Evaluate the validity of previous measurement when equipment is found to be out-of-calibration	

2. What can be done

Initiating: WGC has developed a process through which both internal or external clients issue requests for projects.

Define requirements: requirements and scope definition guidelines as well as forms and templates have been established and used thoroughly.

Prepare the environment: there is no process for the preparation of the environment of the project.

Planning: WGC has created two different processes for planning projects' scope. One refers to internal projects' needs and the other one to external projects' needs.

Organize and estimate resources: There is no process that clearly results on the organization and the resource estimation. However the estimation is performed as complementary task of other processes.

Define control functions: There are different types of control functions established, which serve different purposes and project factors.

Develop the schedule: schedule development process is established and defined in brief.

Define performance indexes: Performance indexes have been defined and described. The use of the indexes is not depicted as mandatory.

Perform risk management: The process does not exist.

Executing: There is no process that defines the execution factors such as make-or-buy decision making.

Implement planned activities: There are processes that define the approval system for activities' initiation and deliverables' acceptance and the resource utilization decisions.

Perform procurement management: The organization has developed in details the processes, forms and templates for planning, conducting, administering and closing procurements.

Monitoring and controlling: This part of the project management process groups has been defined in detail and for different aspects of the project. Quality of products and services is verified and ensured through audits and customer satisfaction measurement processes.

Monitor and control communications, and report on progress: There is no communication processes established as a separate subject for effective project management. Reports have been defined and indexes have been described. There is no specific process though.

Manage change requests: There have been established processes, forms and templates that are satisfactorily developed to effectively serve the change request and escalation reports management.

Monitor and control financials: Project management processes that monitor budget and cost related to human resources are poor.

Closing: there are processes that effectively serve the closing of projects and contracts or SLAs.

3. What must be done

In this section will be presented what must be done for successful adoption of ELOT1429 and is not currently covered by the organization's processes.

Initiating: The organization must establish a process for designing the project's folder from the initiating phase where the development and the maintaining actions should

be depicted in detail. It shall include the hard copy and electronic format documentation of the project management methodology outcomes per project.

Define requirements: WGC must align the projects and their selection criteria to the organization's strategy. It is then mandatory to establish a process for strategic goals definition and basis for strategic planning. The organization should adopt and maintain business plan computer software. The last required and missing factor is the definition of the scope performance indexes.

Prepare the environment: It is mandatory to establish a process or a group of processes for studying the project's success factor or generally the critical factors. This means that before the project planning starts there must be cost estimation of order of magnitude accuracy or in another example, the communication management plan and the channels involved. Thus a study of the critical factors will be the basis for the effective and efficient planning processes implementation in a later phase.

Planning: Detailed project planning should be established covering all the required by ELOT1429 subjects. The current missing parts from WGC's ISO9001 processes are the following:

- Performance indexes' definition
- Risk management planning
- Communications management planning

Organize and estimate resources: WGC must establish a process for the formal decision making over the project team assembly initiation. One or more methodologies for project team assembly must be established. In addition, there must be all the necessary

tables populated with data that show in which projects and at what extent a specific resource has been or will be engaged or utilized.

Develop the schedule: Processes must be established for developing project schedules in detailed level and in master plan level, depicting with the highest accuracy possible the estimations on each resource type requirements. For schedule monitoring and control purposes in case of project or project part procurement, the organization must have direct or online connection to the subcontractor's monitoring system.

Define performance indexes: WGC must establish performance indexes that provide various figures of the project's progress accurately and near real-time data. For this purpose, the necessary software application has to be adopted and established.

Perform risk management: The organization must establish a risk management plan process that will result in the risk management activities. The monitoring and control, of the risks identified, with a risk response plan that has financial impact and has been developed before the budget establishment.

Closing: The organization must develop a system for archiving the outcomes of project management processes. In addition, WGC should separate the project closing projects from the executing process group in order to be able to monitor and control them more effectively and efficiently.

4. What must be known

Based on the section that describes what must be done, this section will list what must be known.

Initiating:

- Project strategic planning

- Project documentation archiving
- Preliminary project planning

Planning:

- Techniques for detailed project planning
- Team building methodologies
- Software adoption for subcontractor performance co-monitoring
- Adoption of earned value management (EVM) and key performance indexes (KPI)
- Risk management practices

Closing:

- Process group establishment
- Project management documentation archiving system

5.1.3 Resource management

One of the most important factors for project and general organizational performance is the competent human resource force which along with the infrastructure and the means will follow the management system processes and succeed by providing the scope in the predefined quality level, on time and within budget.

1. What is known

Human resources and working environment: The organization must ensure the competence of anyone within the organization that could directly or indirectly affect the ability of the organization to meet projects' product or service requirements. The competence requirements have to be met early in the resource assignment phase with a proactive approach. That is, to provide training, evaluate the effectiveness of the organization's training and awareness activities and maintain suitable records which show

that personnel within the organization and especially within project environment are competent. Additionally, the organization must provide suitable work environment by identifying it, and managing it after establishment in order to ensure that product requirements are met.

Infrastructure, equipment and means: WGC must provide the necessary infrastructure to the workers by identifying the infrastructure needed providing it and maintaining it in order to ensure that product or service requirements are met.

2. What can be done

Human resources and working environment: The organization does not have a process or a set of processes that manage resource pools nor there exists a pool with competency description for each resource.

Infrastructure, equipment and means: The organization has established the set of processes for resource management. There are no measurable indexes established in order to manage the resources effectively and efficiently.

Information and communication technology (ICT) infrastructure: WGC has implemented since 2008 an enterprise resource management system that is capable of providing the ICT requirements.

3. What must be done

Human resources and working environment: The organization must develop and maintain for each project and program a resource management pool in format of documentation and tables that will identify all the resources involved. The information should not only identify the resource but its competence and maturity as well, with regards to performance during the project phases. The not covered needs in terms of resources and

competence should also be depicted. Possible training for covering the needs of the project for the human resource competency should be documented and results should be measured.

Infrastructure, equipment and means: There must be a process or a set of processes established for efficient and effective resource management, especially for the material type of resources. The sufficient quantity must be warranted for the whole project life cycle and the utilization of materials that need special treatment have to be supported by the definition of a plan. The quality of the materials will define the quality of the deliverables, so quality standards should be set, measurements should be established and performed regularly, and control actions should be taken in case there are variances comparing to the baseline of the quality of materials and equipment.

Information and communication technology infrastructure: WGC should maintain a system that capable of presenting the projects activities in a format that supports the project plan and the project folder structure, of presenting the entire schedule and of supporting the change and configuration management activities that might occur in the plan. Such software application is called project management information system (PMIS). Also, as an additional system to the PMIS, it is necessary to establish and maintain a financial and budget management information system. All systems must incorporate the resource management concepts and report generation. There should be established an intranet that presents the basic information regarding the project either for the internal resources' information requirements or for customer information requirements

4. What must be known

Human resources and working environment: Human resource management

- Human resource planning

- Acquiring, developing and managing the project team
- Responsibility assignment matrix
- Resource calendars
- Team building techniques
- Reward and recognition system
- Ground rules
- Dispute resolution system

Infrastructure, equipment and means: Enterprise resource management

Information and communication technology (ICT) infrastructure: Communication management

- Communication technology, models and methods
- Reporting systems

5.1.4 Results evaluation and performance improvement

This section involves the processes that need to be established for feedback collection from all other processes of the MS, the analysis of those processes and the improvement actions that need to be taken.

1. What is known

MS feedback, analysis and improvement actions: It is crucial to identify, plan and implement the monitoring, measurement, and analytical processes that the organization needs to have in order to be able to demonstrate conformity and make improvements.

Internal verifications: WGC must establish methods that can be used to monitor and measure customer satisfaction (perceptions) in terms of project performance. The organization should establish an internal audit procedure, carry out internal audits of the

MS and take actions to address the audit results. Select the suitable methods to monitor and measure the processes that make up the organization's MS, tailoring the methods to fit auditor's requirements

External auditing: There must be an external auditor selected and the cooperation must be smooth for organization's best interest.

Complains management: Internal and external complains must be handled with care and taken into consideration when planning for improvement actions.

Performance records and suggestions on improvement actions: The organization must establish, document, implement and maintain nonconforming products or services procedure. Additionally, WGC should figure out what kind of data is needed to be collected about the organization's MS. Then collect these data and provide information by analyzing the MS data. The effectiveness of the MS must be continually improved and the actions and processes established for this purpose must be demonstrated.

2. What can be done

MS feedback, analysis and improvement actions: WGC has implemented all the necessary processes for collecting the feedback, analyzing and setting the basis for planning the required improvement actions.

Internal verifications: WGC has successfully established processes for internal verification in different levels and departments.

External auditing: There is experience inside the organization for audit management and the processes for maintaining the MS tailored for external audits are well defined.

Complains management: Complains are collected or even requested as an input from customers and project sponsors in general. Improvement actions are then planned and executed by the organization. Internal complain management is missing.

Performance records and suggestions on improvement actions: The organization establishes, documents, implements and maintains nonconforming products or services procedure.

3. What must be done

MS feedback, analysis and improvement actions: WGC must archive all the information and documents involved in these processes.

Complains management: WGC must implement internal complain management process or set of processes.

4. What must be known

Complains management: Complains management.

5.2 Organizational culture definition

The results of the survey have been successfully gathered and analyzed. Twenty-one valid responses have been collected as paper-based questionnaire. The demographic information shows that approximately 19% of the responders are managers, 48% are technicians, 14% are senior technicians and 19% are directors. All responders are working in the same environment of work and in the same pyramid of hierarchy meaning that the general manager of the organization has authority in all of the responder's activities and human resources. The demographics show that:

- Male (76%), Female (24%)
- Age: 30 years or younger (38%); 31 to 35 years (14%); 36 to 40 years (43%); 41 to 50 years (5%); 51 to 55 years (0%); 56 years or older (0%)

- Current job position: director (19%); manager (19%); senior (14%); technician (48%)
- Years of service in the organization: 1 to 5 years (67%); 5 to 10 years (14%); 10 to 20 years (19%); more than 20 years (0%)
- Number of subordinates: none (52%); 1 to 5 (33%); 6 to 10 (10%); 11 to 15 (0%); 16 to 20 (5%); more than 21 (0%);

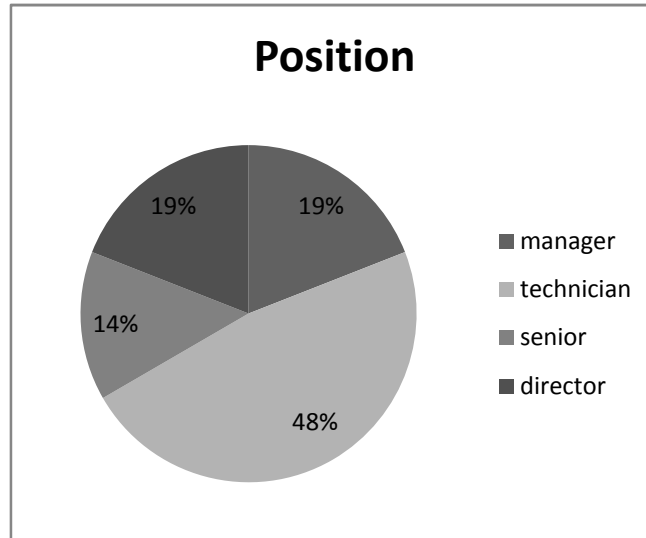


Figure 9: Responders' position in organization

Table 5: Demographics

Position		Gender		Age		Years of service		Subordinates	
manager	19%	male	76%	30 or younger	38%	1 to 5	67%	none	52%
technician	48%	female	24%	31 to 35	14%	5 to 10	14%	1 to 5	33%
senior	14%			36 to 40	43%	10 to 20	19%	6 to 10	10%
director	19%			41 to 50	5%	21 or more	0%	11 to 15	0%
				51 to 55	0%			16 to 20	5%
				56 or older	0%			21 or more	0%

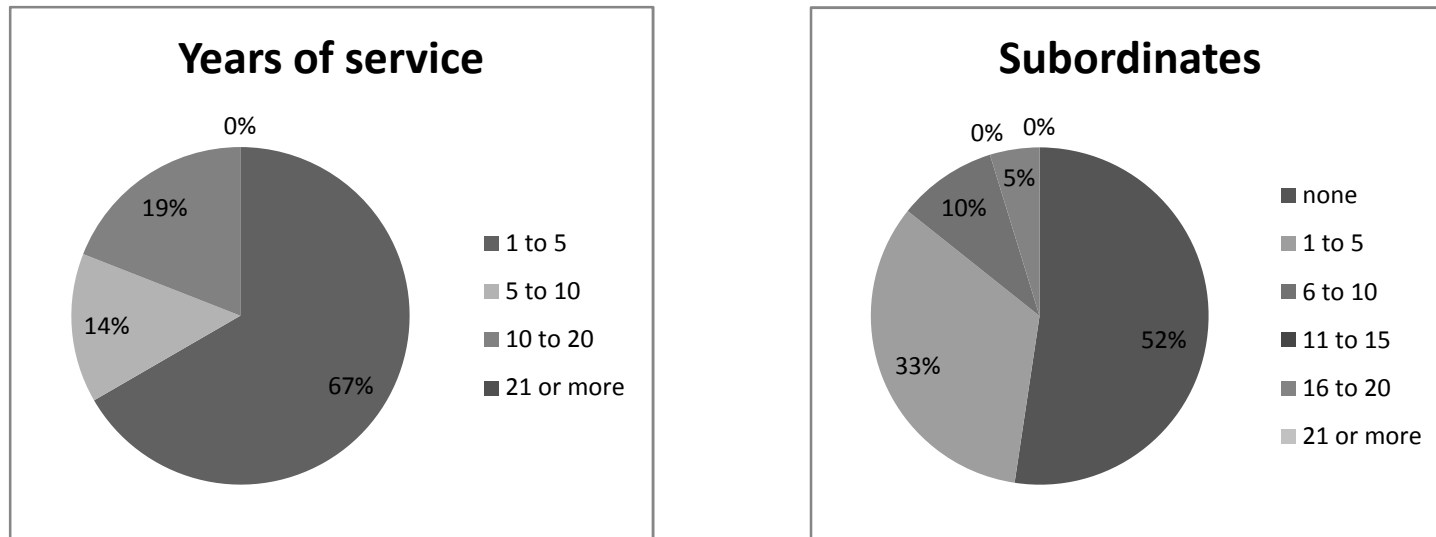


Figure 10: Responders' years of service and subordinates in the organization

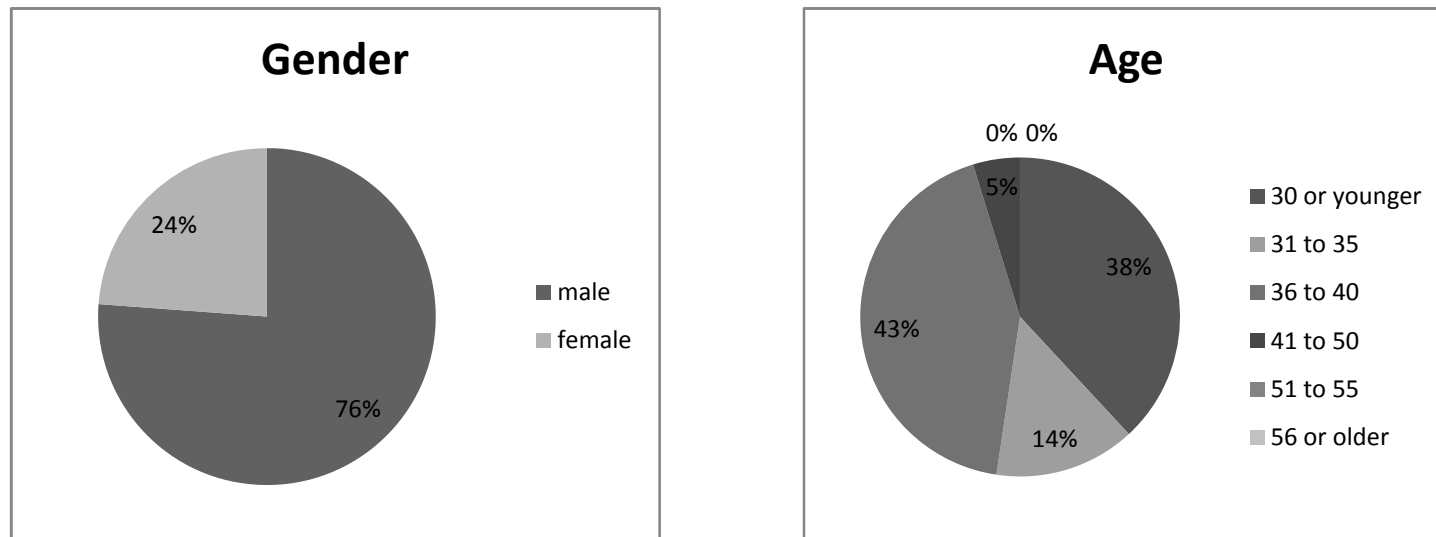


Figure 11: Responders' gender and age

Based on the competing values framework from Cameron and Quinn, the culture orientation of the organization is shown in the following table.

Table 6: Organizational culture orientation

Culture orientation	Clan	Adhocracy	Market	Hierarchy
Mean	26,48%	21,37%	27,71%	24,44%
SD	64,44	49,84	52,30	59,44

The most common culture is the market orientation. In this culture orientation, the essential aspects are the achievements, competition, and the market share. The external environment is perceived as hostile and the organization is results oriented. The second common culture is the clan orientation, were strong personal relationships, mentoring, facilitation, trust, teamwork, consensus, openness, human resource development and concern for people are the dominant characteristics.

The next figure presents the plot of the summary of culture orientations per responders' position.

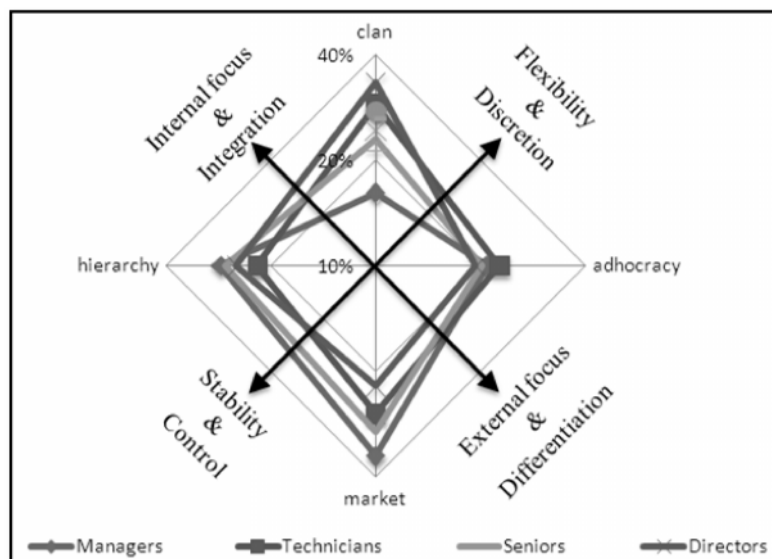


Figure 12: The Organizational Culture Assessment per position

The probability plot is presented in the following image and shows the consistency of the clan and market orientation values.

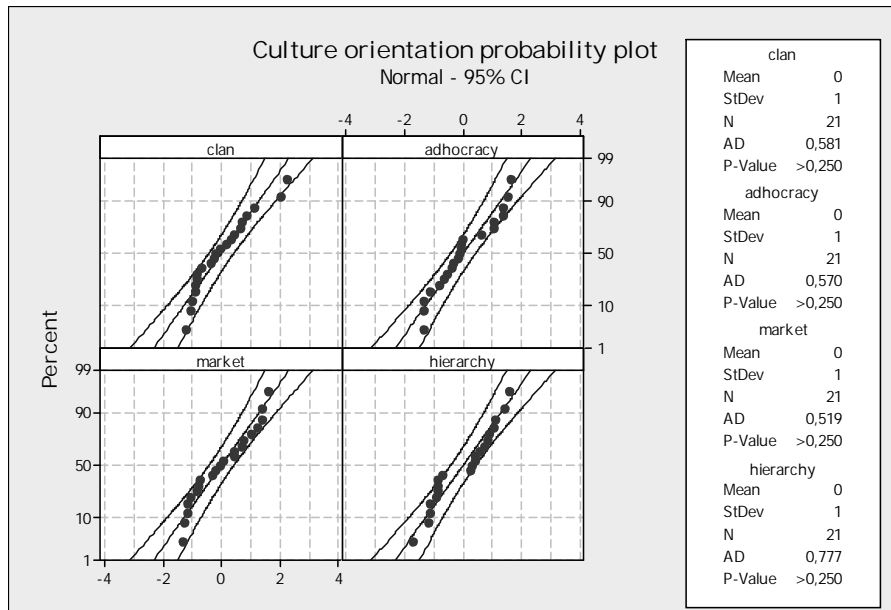


Figure 13: Probability plot with standardized values

The distribution plot, in the following figure, presents the probability of the values within 'two' sigma.

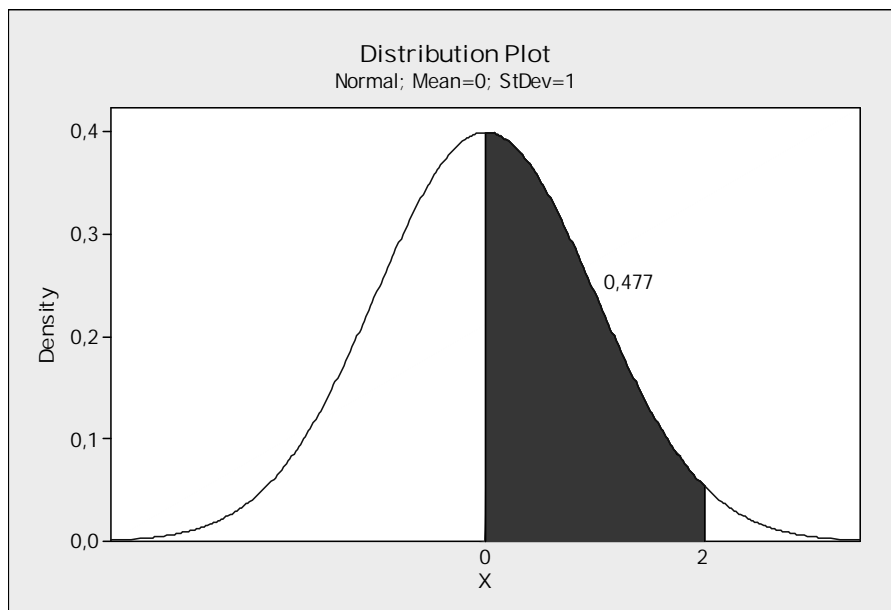


Figure 14: Normalized distribution plot

5.3 Project management maturity models’ analysis

In this section, the target maturity models (OPM3 & P3M3)and the baseline maturity model (ELOT1329) will be compared with regards to the support and integration of the project management maturity model assets, which are identified as crucial by Bourne & Tuffley (2007), Buglione (2009), Chui (2005), Emasoft (2006), Fitsilis (2008), Ibbs & Kwak (2000), Iqbal (2007), Isaias (2009), KPMG (2007), Kerzner (2007b), Kwak & Ibbs (2000), International Project Management Assosiation Inc. (2006), Project Management Institute Inc. (2009), Pennypacker & Grant (2003), Wheatley (2007), Yazici (2009) and Sowden (2008), in order to define the improvements and the changes required for the baseline maturity model to reach the shape and consistency of the target maturity model. Out of 43 crucial assets that a PMMM should address, ELOT1429 fails to address 56% of them according to P3M3 and 44% according to OPM3. The following figure shows the influence of each PMMM over ELOT1429.

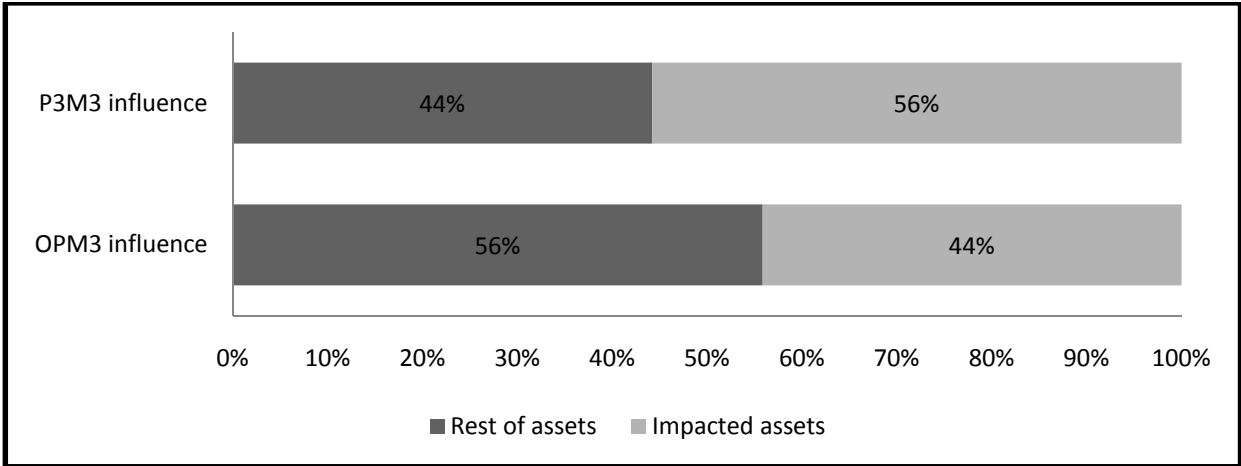


Figure 15: Percentage of the impact of OPM3 and P3M3 respectively over ELOT1429 with respect to overall assets

Table 7: Target and baseline maturity model gap analysis results

	Baseline maturity model	Target maturity models		Added assets
	ELOT1429	OPM3	P3M3	
Project, Program and Portfolio management guides / standards	No	PMBok, Program & Portfolio standards.	Prince2, Project, Program & Portfolio models	✓ [*]
Maturity model institute's devotion in the project management discipline	Low ELOT	Very High PMI	Very high OGC	✗ [†]
Project management maturity assessment's results presentation	Level 1 to 3 per process family	Percentage of: ➤ maturity in PPP management ➤ Overall relative maturity	Level 1 to 5 per perspective	✓
Primary target discipline	Managing projects of public interest	No specific discipline approach	No specific discipline approach	✗
Level of maturity	Level 1 to 3	Continuous based on stages 1 to 4	Level 1 to 5	✓

* The asset or characteristic should be integrated, improved or changed to meet the standard set by OPM3 or P3M3 or both.

† The asset is accepted as is for the adoption of ELOT1429

Level of detail	Low	Very high	Very high	✓
Evaluating organizational effectiveness	Unclear	Present	Present	✓
Evaluating financial effectiveness	Unclear	Present	Present	✓
Evaluating maturity by project processes and phases	Present	Present	Present	✗
Compare and correlate with actual project performance	Unclear	Present	Present	✓
Best practices suggestions	Absent	True	Unclear	✗
Derive ROI calculations	Absent	Absent	Present	✓
Applied to actual organizations	Absent	Present	Present	✗

Commitment for continuous improvement	Unclear	True	True	✓
Potential impact on project management community	Medium	Very high	Very high	✗
Target industries and organizations	Constructions and, supply	Any	Any	✗
Knowledge areas Involved	4*	9 [†]	7 [‡]	✓
Project management spending calculations	Absent	Unclear	Present	✓
Behavioral context Framework	Absent	Unclear	Present	✓
Questionnaires & IT systems for support of self assessment	Absent	Present	Present	✓

* Management and organization; Human resource and infrastructure management; Project implementation; Performance improvement;

[†] Integration, Scope, Time, Cost, Quality, Human Resource, Communications, Risk and Procurement management

[‡] Management control; Benefits, Finance, Stakeholder, Risk and Resource management; Organization governance;

Project management office activities integration	Absent	Present	Present	✓
Certifications for individuals' competency assessment in PM	Absent	Present	Present	✓
Implementation guide details	Medium	Very high	Very high	✗
Process groups	Present	Present	Present	✗
Facilitated self assessment duration in days	Unknown	4	4	✓
Maturity model life cycle	Unclear	Continuous	Continuous	✓
Training Programs and courses	Absent	Present	Present	✓
Performance indexes suggestions and integration	Absent	Present	Present	✓

ISO quality MS standard alignment	Tight	Optimized	Optimized	X
SEI capability maturity model (CMMi) alignment	Absent	Optimized	Tight	X
Statistical proof of maturity model effect and self assessment	Absent	Present	Absent	X
Organizational project management processes	Present	Present	Present	X
Project manager role definition	Absent	Present	Present	✓
Background in project management discipline	Light	Strong	Strong	X
Explanation of model architecture	Light	Strong	Optimized	X
Assessment tools, information technology and guides	Absent	Present	Present	✓

Compatibility with other maturity related MS	ISO9001	Unclear	CMMi	X
References that justify the accuracy of methods and processes	Unclear	Present	Present	X
Link to strategy	Absent	Unclear	Present	✓
Project selection processes or methods	Absent	Unclear	Present	✓
Program and Portfolio management processes	Absent	Present	Present	✓
Compare the project status against continue or terminate criteria	Absent	Unclear	Present	✓
Totals of assets impacted by OPM3 and P3M3*		19	24	

* Assets that are incorporated or modified according to OPM3 and/or P3M3 are highlighted in the table

5.4 Application methodology development

The application methodology consists of two parts. The first part is related to the change management processes that address the requirements defined by the knowledge gap report (ALD), the PMMM's analysis (PMMMA) and the organizational culture report (OCA). The second part is related to the integration of ELOT1429 and certification.

All processes developed by WGC should devoutly serve the Deming's model, Plan-Do-Check-Act. At the same time, all processes should be developed with an approach that respects the process group integrity, as per the ALD, PMMMA and OCA. The following figure illustrates the methodology steps for the first and the second phase serving a system approach.

The assessment processes have to be developed in parallel to the change management process development in order to cover the most of the aspects that are crucial for an effective and efficient change management.

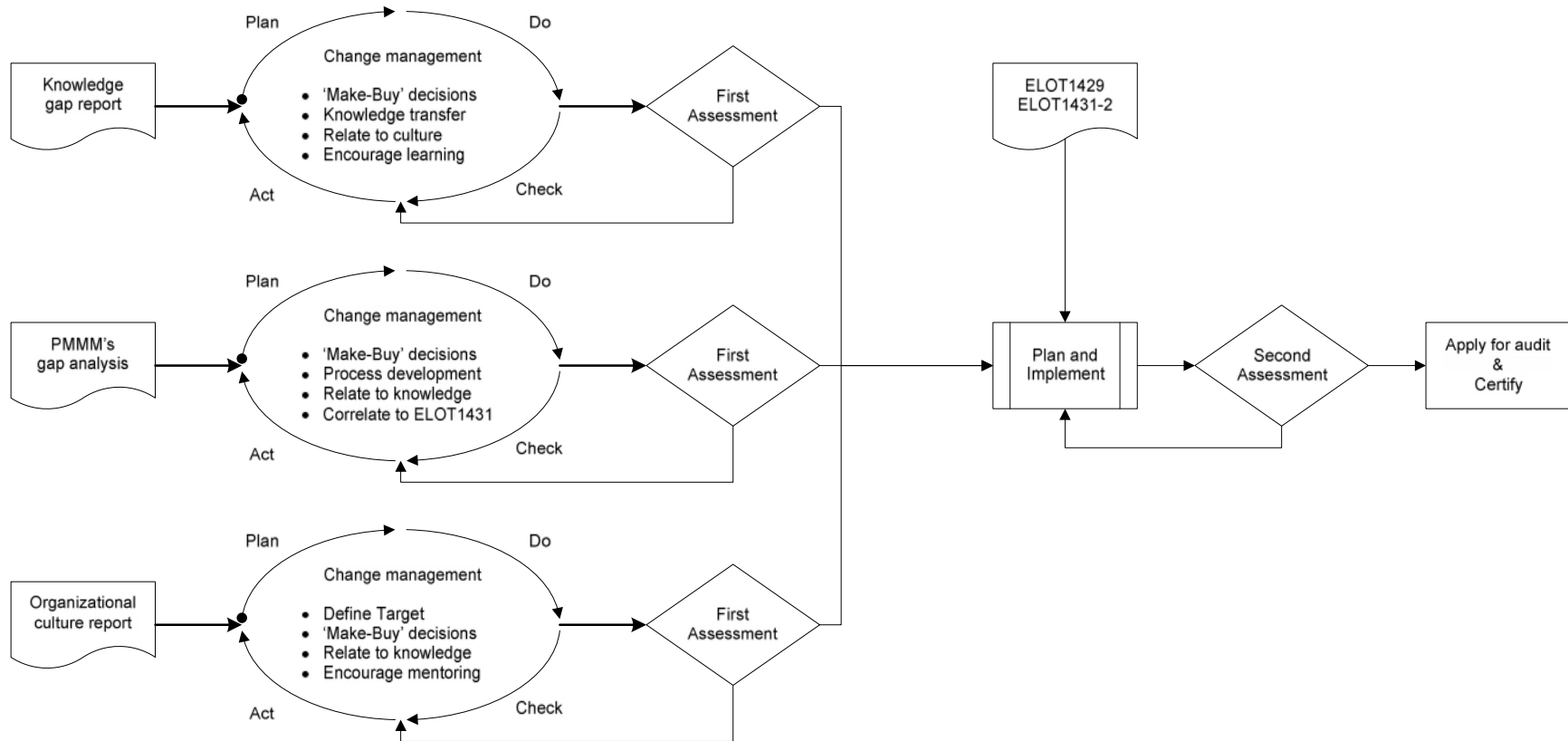


Figure 16: System approach to ELOT1429 application methodology development

Conclusions

The knowledge gap report clearly shows that WGC has an amount of knowledge that covers most of ELOT1429 needs. More specific, the knowledge gap report points to incompetence related to:

- Human resource management and teamwork evaluation
- Strategic project selection and risk management
- Performance improvement and reporting system
- Documentation management

These gaps clearly explain the some facts that I have personally observed during my five years employment in the company. These facts are:

- Key-personnel leaves the company or is discouraged early
- ROI of products and services is not equivalent to the efforts of the working teams
- Quality of service remains constantly poor
- Knowledge transfer process is difficult or impossible

The applicability level of ELOT1429 on the WGC management system is considered to be of medium difficulty, thus the addressing of the knowledge gaps for the elimination of the problems identified by the above facts is crucial for the successful implementation of the standard.

The organizational culture definition shows that the most common culture is the market orientation. In this culture orientation, the essential aspects are the achievements, competition, and the market share. The external environment is perceived as hostile and the organization is results oriented. The second common culture is the clan orientation, were strong personal relationships, mentoring, facilitation, trust, teamwork, consensus,

openness, human resource development and concern for people are the dominant characteristics.

Analyzing the organizational culture per group of responders, as per their position in the company, there is a large gap between the managers and the technicians with regards to the clan and market orientations, while the adhocracy and hierarchy orientations are at similar levels for all groups (Figure 12).

Managers and technicians should have a consistent opinion over the market and clan orientations of the organizational culture. Technicians should be informed with regards to the market orientation by managers in order to be lined up with the companies' goals in the respective market. On the other hand managers should get the necessary information with regards to the levels of personal relationships, mentoring, facilitation, trust, teamwork, consensus, openness, and human resource development aspects inside the organizational environment. In other words, top management should devoutly direct in the direction of making the managers become effective and sufficient leaders and the technicians more devoted followers.

The second aspect that derives from the organizational culture definition is related to the hierarchy and adhocracy culture orientations. Hierarchy orientation, which depends on the levels of internal focus and integration as well as the stability and control, should grow in WGC environment in order to have a successful integration of the new management system ELOT1429. This could be achieved in two ways, either directly impacting the factors described above or by lowering the levels of the discretion, flexibility, external focus and differentiation which describe the level of the adhocracy culture orientation.

With regards to PMMMs gap analysis, ELOT1429 covers only half of the assets of the international models, as per the information presented in Figure 15 and Table 7. This result proves the necessity for incorporation of assets not covered by ELOT1429 since project management discipline has been proven to be based on the overall management system stability which is achieved only by applying system approach process development.

All assets that are not covered by ELOT1429 constitute the need for improvement and define the specific gap that could drive the standard's improvement process.

WGC should train the project managers and other personnel on specific areas such as project management ROI calculation, project performance measurement and methodologies development techniques. Simultaneously, the organization should cover other assets by integrating ICT systems or other related systems.

As a final step, WGC should acquire a certification from international organizations in order to prove the competency in project management in other, international regions.

6.1 Recommendations

Based on the high values of the standard deviation (SD) and probability (p-values) presented in Table 6: Organizational culture orientation Table 6 and Figure 13 respectively, I recommend for further analysis with regards to the organizational culture assessment by involving more employees, top management personnel and virtual teams that operate in the Greek and international region for WGC in order to achieve lower values of SD and p-values, making the research more reliable.

6.2 Discussion

The upcoming ISO21500 standard in project management is scheduled to be deployed in the market in mid 2012. Based on the fact that it is being developed by international organizations in cooperation with IPMA, OGC and PMI it is an opportunity

for WGC to be ahead of its time and adopt management system assets from P3M3 and OPM3 since similar approach will be followed in ISO21500 as well. This action will make the integration of ISO21500 easier and less painful.

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Appendix A: Organizational Culture Assessment Instrument

1. Dominant Characteristics		Score
A	The organization is a very personal place. It is like an extended family. People seem to share a lot of them.	
B	The organization is a very dynamic entrepreneurial place. People are willing to stick their necks out and take risks.	
C	The organization is very results oriented. A major concern is with getting the job done. People are very competitive and achievement oriented.	
D	The organization is a very controlled and structured place. Formal procedures generally govern what people do.	
Total		100
2. Organizational Leadership		Score
A	The leadership in the organization is generally considered to exemplify mentoring, facilitating, or nurturing.	
B	The leadership in the organization is generally considered to exemplify entrepreneurship, innovating, or risk taking.	
C	The leadership in the organization is generally considered to exemplify a no-nonsense, aggressive, results-oriented focus.	
D	The leadership in the organization is generally considered to exemplify coordinating, organizing, or smooth-running efficiency.	
Total		100

3. Management of Employees		Score
A	The management style in the organization is characterized by teamwork, consensus, and participation.	
B	The management style in the organization is characterized by individual risk-taking, innovation, freedom, and uniqueness.	
C	The management style in the organization is characterized by hard-driving competitiveness, high demands, and achievement.	
D	The management style in the organization is characterized by security of employment, conformity, predictability, and stability in relationships.	
Total		100
4. Organization Glue		Score
A	The glue that holds the organization together is loyalty and mutual trust. Commitment to this organization runs high.	
B	The glue that holds the organization together is commitment to innovation and development. There is an emphasis on being on the cutting edge.	
C	The glue that holds the organization together is the emphasis on achievement and goal accomplishment. Aggressiveness and winning are common themes.	
D	The glue that holds the organization together is formal rules and policies. Maintaining a smooth-running organization is important.	
Total		100

5. Strategic Emphases		Score
A	The organization emphasizes human development. High trust, openness, and participation persist.	
B	The organization emphasizes acquiring new resources and creating new challenges. Trying new things and prospecting for opportunities are valued.	
C	The organization emphasizes competitive actions and achievement. Hitting stretch targets and winning in the marketplace are dominant.	
D	The organization emphasizes permanence and stability. Efficiency, control and smooth operations are important.	
	Total	
6. Criteria of Success		Score
A	The organization defines success on the basis of the development of human resources, teamwork, employee commitment, and concern for people.	
B	The organization defines success on the basis of having the most unique or newest products. It is a product leader and innovator.	
C	The organization defines success on the basis of winning in the marketplace and outpacing the competition. Competitive market leadership is key.	
D	The organization defines success on the basis of efficiency. Dependable delivery, smooth scheduling and low-cost production are critical.	
	Total	

