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THE IMPLEMENTATION OF QUALITY ASSURANCE IN THE HELLENIC NATIONAL CADASTRAL PROJECTS

Abstract

The use of **Quality Assurance (QA)** in **Project Management (PM)** is not something new or incompatible. QA and PM are parts of the same theoretical frame known as Operations Management, having supplementary roles in a Project Life Cycle. In this paper, a brief presentation of the implementation of QA in the Hellenic National Cadastral Projects is at first made. Scientific documentation, technical specifications introduced by the supervising state authority and personal interviews with QA directors of several Surveying and Cadastral Offices of Thessaloniki, which are contractors of cadastral projects, were used to gather information about the existent application of QA. A questionnaire focused on the problems of Re-engineering and Change of Management Culture, on the incomplete education in QA, on Quality Cost and on techniques and methods of Quality Improvement was also used for this task. Then, the problems and glitches of the current situation are underlined and some proposals are made to assist the Hellenic Surveying and Cadastral Offices in becoming competitive international companies. This can be achieved via the implementation of QA not only as a control tool, but also as a successful Management Method proving that the role of QA does not stop with ISO (or other) certification, but on the contrary this is the time, when it starts.

1. INTRODUCTION

The organizational issues of surveying and cadastral offices that are contractors of cadastral projects in Greece as well as of the supervising state authority are examined in this paper. The paper is focused on the implementation of Quality Assurance in the Hellenic National Cadastral Projects. It is not concerned with the technical part of Quality as it is used for the verification of measurements or other techniques of data field collection and processing. This subject is covered with the technical specifications and statistical controls of the results of geodetic, surveying, and photogrammetric techniques. The orientation of this paper is basically towards the administrative application of Quality Assurance as part of Total Quality Management (TQM). This procedure incorporates quality controls of data collection and manipulation but it underlines that these controls are but a subtotal of TQM. By concentrating only on such controls a major feedback in the development of Hellenic National Cadastral Projects can be observed.

The above statements do not imply that the products submitted by the contractors do not meet the technical specifications set by the Hellenic Cadastre S.A. On the contrary, many times they overcome the requirements. However, it has been evident that the development and application of the Quality Assurance Systems by several possible contractors in a very short time during the different stages of announcement and realization of Hellenic National Cadastral Projects introduces major problems leading to erroneous opinions and actions. For example, it is very common to consider Quality Assurance as bureaucracy and unmerited cost, being worth only as the means for obtaining a certificate for mainly advertising reasons. For a better understanding and application of Quality Assurance in the Project Management of cadastral tasks, the basic principles and methods of TQM will be briefly described. Then, five case studies concerning surveying and cadastral offices in Thessaloniki will be analysed and, finally, several conclusions and proposals will be presented.

2. BASIC PRINCIPLES AND METHODS OF TOTAL QUALITY MANAGEMENT

Total Quality Management is the total of activities and methods used by an enterprise in order to fulfill the requirements of a client with the least cost. This can be achieved by activating all the resources of the enterprise (technostructure and infrastructure) and using learning procedures and innovative ideas springing from inside or from the surroundings of the

enterprise. TQM presupposes that its principles will be applied to all levels of the organization of the enterprise. This implies that it must be incorporated not only in every product or service provided (as many people may think) but also to all levels of activity, from the cleaning woman to the General Manager, more intensively for the high ranked executives.

Total Quality Management can be developed in four stages:

- **Stage 1 - Inspection**

Inspection is the comparison of the characteristics of the final product to the technical specifications. It is an elementary way for the control of a product or service. The basic actions taken in Inspection are grading and evaluation, corrective actions and determination of the causes responsible for a miss or failure.

- **Stage 2 - Quality Control**

Quality Control follows Inspection and is the total of operational and technical procedures which can confirm the quality of a product or service according to specifications. The basic components of Quality Control are the quality handbook, inspections and controls, product testing, and data documentation.

- **Stage 3 - Quality Assurance**

Quality Assurance is the total of pre-programmed or systematic actions and procedures necessary for ensuring that a product or service fulfills and will continue to fulfill certain specifications. The basic components of Quality Assurance are systems control, quality design, statistical quality control, certification by third parties, cost of no quality, and analysis for the determination of the causes responsible for a miss or failure.

- **Stage 4 - Total Quality Management**

As stated above, Total Quality Management is the total of activities and methods used by an enterprise in order to fulfill the requirements of a client with the least cost, emphasis given on the link between Total Quality Management and Quality Assurance. The basic components and actions of Total Quality Management are continuous improvement, participation of clients and suppliers, participation of all levels of the enterprise, evaluation of performance, team work, and involvement of all the personnel.

It is evident that a successful cadastral project does not only consist of maps and databases but also of timeplan, cost estimation and procedures for updating and maintenance of the functionality of the final cadastral system. To succeed in such a task, the supervising authority and the contractors must use a Quality Assurance System. The experience from the beginning has shown that the contractors (being private enterprises) were not happy to invest in a Quality Assurance System without really understanding the benefits and without a visible and quick repayment.

The security provided by a Quality Assurance System to a cadastral project can be obtained only if both the supervising authority and the contractors use it. In this way, the Quality Assurance System will stop being just a conventional and bureaucratic activity and very soon will ensure the fulfillment of specifications, the minimization of the cost of production and, finally, the repayment of the investment

3. CASE STUDIES CONCERNING SURVEYING AND CADASTRAL OFFICES IN THESSALONIKI

In order to investigate the level of the application of Quality Assurance in surveying and cadastral offices, a questionnaire was answered by the Quality Assurance Executive or the General Manager of five such offices of Thessaloniki, all of them being contractors of Hellenic National Cadastral Projects during a personal interview and discussion.

The surveying and cadastral offices of Thessaloniki participating in this survey and the persons conducted were:

- ✚ Shediasmos Ktimatografiki (Goutnas Athanasios – Quality Assurance Executive).
- ✚ Geoanalysis (Papadopoulou Despina – Quality Assurance Executive).
- ✚ Armonia (Bartzopoulos Thomas – General Manager).
- ✚ Horotechniki (Papakonstantinou Georgios – General Manager).
- ✚ Anonymous – the anonymity of the enterprise and the conduct person was asked.

The presentation of the level of Quality Assurance application in each enterprise will be done by keeping the anonymity of all, the five offices being noted as «Company A», «Company B», ... , «Company E» in random order. This is due to the fact that this paper does not intend to criticize but to underline and summarize problems in a more general way.

4. THE QUESTIONNAIRE: ANSWERS AND COMMENTS

The questionnaire answered by the above mentioned persons is shown in Table 1.

Table 1	
The questionnaire for the investigation of Quality Assurance application in surveying and cadastral offices of Thessaloniki	
1	How many persons have been employed in the office for the last three years?
2	Give the mean annual total gross income for the last three years.
3	Describe briefly the organizational flowchart of the office (or submit copy).
4	In which phases of the Hellenic National Cadastre were you contractors?
5	Have you developed a Quality Assurance System for cadastral projects?
6	What were the standards used and who was the external consultant?
7	How much time was needed for the development of your QAS?
8	Have you computed the cost of no quality?
9	What were the qualifications of the Quality Assurance Executive? (graduate and post-graduate studies, experience)
10	Does the Quality Assurance Executive work also with other activities in the office?
11	Have you developed a QAS for other activities of the office?
12	Have you been certified? By what organization?
13	Do you apply methods of Total Quality Management?
14	What methods for improving quality do you use?
15	From improving quality methods used, which one you find more effective and why?

The answers given by the executives or general managers of the participating offices are as follows:

COMPANY A

Company A is a surveying and cadastral office organized in the past as a family enterprise. Being a contractor in all phases of the Hellenic National Cadastre, the company had a rapid development. Today, it employs about 20 persons permanently and about 20 persons on a seasonal basis (mainly working in the Cadastral Offices). The mean annual total gross income is about 250.000.000 drs. Because of the requirements of the supervising authorities, the company decided to start a procedure of organizational changes and re-engineering based on a Quality Management System. Since October 1998 and with the help of an external consultant, a Quality Assurance System has been applied, the aim being the certification of the company according to the ISO9001 standard.

The company has shown no interest to determine the cost of no quality. The Quality Assurance Executive is the oldest partner in the office, who is also responsible for many more activities. They believe that he needs the assistance of another person specialized in the use of Geographical Information Systems. Although they say that the company does not incorporate principles and methods of Total Quality Management (realizing TQM as the complete application of the QAS), they use methods of quality improvement such as meetings of the administration with directors of departments, documentation of procedures, control of resulting products, file backup and training of the personnel in their field of work. The

company considers training of personnel as the most effective method for quality improvement and finds essential the occurrence of two persons being capable to work with the same program. The organizational flowchart of the office can be characterized as simple and typical, with no evidence for dynamic re-engineering, showing just an effort to meet the requirements of the supervising authority.

COMPANY B

Company B is a cartel of surveying and cadastral offices functioning as a company. Today, it employs about 30 persons permanently and about 12 persons on a seasonal basis (mainly working in the Cadastral Offices). The mean annual total gross income is about 250.000.000 drs. It was a contractor in the second preliminary and in the first main phases of the Hellenic National Cadastre. Company B has been a certified enterprise since March 2000, according to the ISO9001 standard. The certification process was done with the help of an external consultant and took a period of 14 months. The Quality Assurance Executive is a partner in the office, who is also responsible for other activities as well. He is willing to be more actively involved in quality issues and thinks that he needs some secretarial endorsement. Although he says he is a supporter of the application of the principles of quality, the company has shown no interest to determine the cost of no quality, and no methods of organized quality improvement have been applied. As with the previous company, they use methods of quality improvement such as meetings of the administration with directors of departments and training of the personnel in new software products or new methods and equipment for measurements (e.g. GPS). Again, the organizational flowchart of the office can be characterized as typical, showing just an effort to meet the requirements of the cadastral projects supervising authority and the certification authority.

COMPANY C

Company C is rather smaller than the previous two mentioned above. Today, it employs about 15 persons permanently and about 10 persons on a seasonal basis. The mean annual total gross income is about 200.000.000 drs. It was a contractor only in the first and second preliminary phases of the Hellenic National Cadastre. The company started a procedure of organizational changes based on a Quality Management System two years ago but this procedure faced several interruptions. The Quality Assurance Executive is not a partner in the office, has a large experience in surveying and cadastral projects but he is mainly working with activities other than quality. The company did not determine the cost of no quality, and no methods of organized quality improvement have been applied. The company makes all efforts to meet the requirements of the supervising authority.

COMPANY D

Company D is the largest of the five enterprises examined in this paper according to the financial statements. It employs about 45 persons permanently and the mean annual total gross income is about 600.000.000 drs. It was a contractor in all phases of the Hellenic National Cadastre and is was certified according to the ISO9001 standard three years ago. They developed the Quality Assurance System in 6 months, use the methods of quality improvement according to the ISO9001 standard but they did not determine the cost of no quality. The Quality Assurance Executive was appointed in this position because of the remarkable knowledge of the technical, administrative and organizational aspects of the company. According to the organizational flowchart, the management is done by the Department of Quality Assurance, but the Quality Assurance Executive works permanently at the Athens branch of the office engaged with many more duties.

COMPANY E

Company E employs about 40 persons permanently and about 30 persons on a seasonal basis (mainly working in the Cadastral Offices). The mean annual total gross income is about 350.000.000 drs. It was a contractor in all phases of the Hellenic National Cadastre and is was certified according to the ISO9001 standard. They developed the Quality Assurance System in 10 months. The Quality Assurance Executive is a partner in the office, who is also

responsible for other activities and is supported by an employee with experience in Project Management. The company did not determine the cost of no quality. Numerous methods of organized quality improvement have been applied, such as meetings of the administration with directors of departments and training of the personnel, along with self-evaluation procedures on an annual basis. The organizational flowchart of the office has a matrix structure which is considered to be more effective for enterprises working with projects.

5. CONCLUSIONS

After the processing and evaluation of the answers given to the questionnaire, following conclusions can be drawn:

- In all the enterprises participating to the survey, the philosophy of Total Quality Management was mostly understood as the means for the production of the final product according to specifications (Inspection – Quality Control).
- In all cases, the application of a Quality Management System was done constrainedly, following the guidelines of the supervising authority for cadastral projects.
- In all cases, the Quality Assurance Executive had no specific Quality Management background.
- Not a single enterprise has ever determined the cost of no quality. This fact shows that they all see Quality Management methods as bureaucracy, and not as an investment.
- It is rather disappointing for a company that has already been certified for three years to state that the certification period lasted only six months, its organizational flowchart to show that it is directed by the Quality Management Division, not to have determined the cost of no quality and not to know methods of quality improvement.
- In practise, the companies try to apply Quality Control and the supervising authority expects the application of Quality Assurance, while they will all benefit from the application of Total Quality Management.
- The appointment of a partner or an older employee as the Quality Assurance Executive shows the immaturity of dealing with quality principles.
- The certification according to some standard (e.g. ISO9001) is considered to be the final target, although it is, in fact, the beginning of a new era.
- After the completion of the survey, it was obvious that most companies are organized and act as big personal enterprises or surveying offices, a task that leads to several possible problems in the near future, when international competition will be part of every-day's life.

At this point, it is not possible to give specific proposals for incorporating the Total Quality Management methods into each company's administrative and productive organization. On the contrary, each case must be treated separately and be thoroughly studied. Although it is not wise to propose general directions, it can be noted that standard Quality Management techniques can be applied, such as Support from Top Management, Cooperative Decision-making, Quality cycles, Just-in-time management theory, Removing Bottlenecks theory, Internal and External Customers principle, as well as Rewards for Performance.

REFERENCES

1. Stolarz D.: *Total Quality Management Applied to Repetitious Surveying Procedures*, GIS/LIS, pp. 715-724, 1994.
2. Ôsiotras G.: *Quality Improvement*, book, Benos Publ. Co., Áthens, 1995 (in Greek).
3. Bridges R., Leeson H., Walker G., and Wheeler L.: *Operations Management*, published by Kingston Business School, London, 1996.
4. Spanos A.: *Total Quality*, book, Galaios Publ. Co., Athens, 1995 (in Greek).