

PROJECT MANAGEMENT FROM THE POINT OF VIEW OF THE SUPERVISOR

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I – INTRODUCTION

This dissertation addresses the supervisor as true management work. Demands to understand the powers and responsibilities of the entity, in particular the supervisor director, and its contribution to the production of a work with quality, according with the terms planned for the time limits, the costs and resources.

The text is divided into two main parts. The first part is based on the study and knowledge of theoretical fundamentals of current legislation, which is applicable in the scope of public works, and in the construction management, follows the application of the above points to the oversight of the work supervising. With application in a case study (second part) the foundations studied are criticized. Finally, we present some conclusions about the work.

II – THEORETICAL FOUNDATIONS

1. Legal Guidelines

There are three legal documents with greater relevance in this study: Code of Public Works (Código dos Contratos Públicos, CCP), Law no. 31/2009 (Lei nº 31/2009) and Ordinance no. 1379/2009 (Decreto-Lei nº 1379/2009), which deal, respectively, with the hiring process for public works, the description of duties and obligations of the people involved in the work, and the determinations of the minimum qualifications required for technicians in project design, works management and supervising.

For some years there was a failure in some construction works of costs and contractual deadlines. The difference between the cost agreed and the actually implemented happened due to lack of quality of design and supervising the work construction. For this last activity is desirable a more rigorous, professional and active (at least) supervising in the implementation phase of the construction work.

In this sense, and according to art. ° 344° of the CCP and the Law no. 31/2009, there are established limitations, responsibilities and duties of the principal actors in the construction work including the supervisor director (with special interest for the study). With the same intention, Ordinance no. 1379/2009 which defines the minimum requirements for work director and supervisor director. Thus, it is intended that the supervisor presence is important at all the works (and in this particular case the public), in a dedicated way.

The implementation of new legal rules it is not enough for the work supervisor to be fulfilled and benefit to the construction work. It is necessary a continuous and present supervising intervention throughout the project. The way to do that is through the compatibilization between the supervising and the management action. Therefore, it is important to understand some concepts of management in particular, its definition and some systems of organization of projects/construction works and teams.

2. Project management

Management is a way to organize and coordinate a project or a team (among others) according to pre-established objectives. The manager is responsible for the coordination and management the project or the team, with the goal to create the finished product (in this case, construction work) in accordance with all requirements in contracts. The manager, whatever the extent of his intervention, should consider that there are at least four phases of the management process that have to be fulfilled: goal settings, planning, implementation and monitoring measures.

Applying the management concepts to the construction work, there are two management systems that could be used: the traditional and phased. In traditional management systems there is a plan that follows a sequence of programming actions, which begins when the procedures is completed. This situation can lead to breaches of the established timetable: if one activity exceeds the planned time, it can affect all the system. Rarely the situation will repeat itself in a phase management system, where it is permissible to start a task before finalizing the predecessor. However, in this system, it may be a situation of overlapping phases, which can be avoided by ensuring a certain sequence respecting the execution time of each activity. The phase management systems, gives the construction work a bigger probability to be performed in

a shorter time (and so in lower cost). There are two ways of phase management practicable in constructions works (special large-scale works): construction management and project management.

The main entity in construction management is the construction manager. It is a position than may be assumed by the supervisor director, who will be coordinate by the owner. The supervisor director should be the one who represents the owner, and must have the skills for coordinating, monitoring and verifying the work that has been executed (in other words, the responsible for the construction management).

In project management, the manager's activity applies to the whole project; in other words, cover the coordination of the whole process of elaborations, implementation and production of the project since the design phase. Here also the supervisor director may take the position of the project manager. However, in this case, he cannot accumulate the functions of the modification, the resolution and the renewal of the contract, according to art. no 334°, CCP.

For construction work organization is appropriate to adopt a full team that count as main actors the designer, the owner, the supervisor director and the contract; that assume a vertically hierarchical according to a phase management.

Different organizational charts can be adopted in construction works. One, with application on smaller woks, identifies the owner as project manager, and in this case the supervisor director should be the responsible for the work verification and control. In another organizational chart, the supervisor director is the project manager, or construction manager (agreeing with the building management system). However, the supervisor team may belong to the owner and in that case there will be only two hierarchical levels, with the owner (which assumes the coordination and supervising the work) and another with the contractor (or with the operate team).

Also important in any organizational system, is communication between actors. Thus, there should be only one voice (supervisor director) that communicates with the contractor in order to avoid duplication of tasks, or even failure to meet such.

3. Supervising the works

In point of view of the supervisor (management), according to *Law no. 31/2009*, the supervisor director should, namely:

- Ensure the verification of the construction work as defined by the execution design;

- Follow the realization of the construction work with periodicity (according to the type of supervision work), with the issuance of guidelines for the fulfillment of the project and regulatory requirements;
- In situations of non conformity, it shall notify the work director, seek their resolution and establishing preventive measures to avoid oncoming non-conformity.

Supervisor director should also perform other functions assigned by the owner.

As a manager, the supervisor director, is responsible for construction work coordinating in order to achieved his objective: construction of the project/work, according with planned costs, deadlines and resources (technical and physical). In this sense must ensure the proper functioning with his team, implementing a clear and accessible communication to all the team.

The supervisor must interfere in all construction work fronts, which involves a multi-disciplinary inspection team reaction. To do so, and according to the dimension of the construction work, the supervisor should not be assumed only by a technician, but by a team with several professionals, under the coordination of the supervisor director. On supervision team, there must be at least one fiscal work, a safety and health technical, and a technician with specialized training in the type of work to be done.

Based on specifications for supervision of three different construction works, and in accordance with the requirements relating to human resources involved (habilitations, experience, length of employment in work), we analyzed the teams and the time allocation for supervision team. In this study, we present alternatives to make up the team review required by the specifications in order to reduce the cost, according actual and average values (provided by supervision companies), without affecting the work quality.

The supervisor intervention should begin at the project elaboration phase in order to prevent spread of errors during the execution phase. The obligations and duties of supervision depend on the work and contract procedure type.

The supervision team should be premature in order to fewer deviations in work (cost and time limits). By this we mean, the later we find non-compliance more difficult it will be to solve them without increased cost. Supervisor director should have access to the specifications, the proposal, the health and safety plan (in design and construction work), the legal and/or regulatory, and other requirements.

In order to synthesize the supervision functions, there are four phases:

- Project Preparation Phase → analyzes and review the project;

- Support to contractor hiring Phase → hiring of the contractor;
- Works execution Phase → coordination and inspection of the contractor: information management plus planning and cost management;
- Works Provisional and definitive Delivery Phase → monitoring during the guarantee and closing of accounts of the work.

Project revision is a process that can be sluggish and has costs associated. However this is the right way to decrease the non-planned costs during the execution phase. There are a few contracts that already consider project revision as a supervision function.

In the execution phase, there are two management systems that should be used by supervision as a way to coordinate, control and verify the work: information management system and planning and cost management system of the work.

The information management system has the control of all documents and information in the work. This system should coordinate all the information about the work and its production, checking the correspondence between the executed and the specification, the law and owner instructions. It is important to implement the control of document actualization in order to avoid their duplications or associated work. This system is essential for the promotion and guarantee of communication between all actors in the construction work. The supervisor director should coordinate these actions.

Cost control includes the responsibility to verification and control the executed in order to record situations of increased the works quantities. Supervising should also do the current account and the final account. In planning control, the supervisor has to guarantee a continuous verification of the executed with the planned, and should also verify the functionality of all resources associated with the activity that is overseen (the equipments, the materials, the constructive process), using measurements and revisions of the work plan. The goal of this analysis is to preview non-conformity and install the measures necessary to prevent them.

In quality management, environment, and health and safety, supervising should collaborate with technicians with training in these areas for the implementation of measures of minimizing environmental impacts, to guarantee the quality and safety and health, designated by the owner.

Supervisor goal should be the guarantee of work quality, that is, the quality of work performed, materials, equipment and processes used. Check the materials quality involves verifying if these do not exceed the permissible levels of environmental impact. In other words, check the quality can be equal to verification the quality, the environment and the health and safety at work, at the same time. For that there are two key documents for verification of quality used by supervising:

the health and safety plan and the plan of management of construction waste.

In the case of quality supervising, general quality manager can collaborate with the supervision team, helping the supervisor director in verification the materials quality, the components and construction equipment that it will be used in accordance with contractual and legislative requirements, seeking to reduce the associated risks. As for the safety and health coordinator (at work) will focus the monitoring and supervising the work methods and construction processes at work, evaluating the safety and health at work.

Throughout his intervention the supervisor director shall developed and use a series of documents such as notices of measurement to verify the costs of the work and receipt for verification of technical resources in the work, work books, reports and/or opinions, that document their activities during the project and construction work .

During the period between the provisional and final delivery, supervising must be available to clarify questions that may arise on any type of work that was involved, or even periodic audits, in order to pro-active maintain (only if specifications say it so).

We analyzed specifications for supervision form three different works (in their features and in the contract procedure), in order to check the veracity of the theoretical concepts about supervision intervention:

- Work 1 – Invitation to "Supervision of Advisory Services and Supervision of the work Primary School ONE and Sports Pavilion ONE";
- Work 2 – Public Tender for "Supervision and coordination of safety and health of contract rehabilitation and upgrading of Bridge THREE";
- Work 3 – Invitation to "Supervision of the work of construction of the" Public Garden FOUR".

The Work 1 it is the only one that predicts design revision before the beginning of the works.

In Work 3 there is a greater involvement of the owner as construction manager, while supervisor is responsible for the checks performed. Also in this document, the only task required under the control of costs refers to the tasks performed and their time.

The specifications for supervision from Work 2 it noted some deficiency in the cost supervising, especially regarding in the increased and decreased works control.

Work 1 is the one that better represents the supervision system that is defended in this dissertation. The specification for supervisions from Work 1 is the only one that predicts environment control in work and the realization of internal audits of the quality system.

III - CASE STUDY

We analyze in detail a real case for supervision of the sea cliff stabilization of Ericeira, north of the Shipwreck Relief Institute (Instituto de Socorros a Náufragos).

This case was analyzed to check the veracity of some of the theoretical study. Thus the chance to confer with this practical application was: if supervision interferes in construction early, with an accompaniment of the design, and with a permanent, active and responsible presence, will be an advantage for the construction work? That is, supervision presence will contribute to building a work respecting the costs, time and quality desired?

To answer these questions, it is presented the draft of the contract, the proposal, the specifications, and finally it is analyzed the technical components, financial and resources (human and technical) involved.

The study case is a small work concerning the protection and enhancement of a sea cliff of Ericeira. In this work are provided four types of work of strengthening the massif: stabilization of blocks by nailing, removal of movable blocks (unstable), implementation of a reinforced concrete beam for reinforcing foundations of houses on the sea cliff, and enhanced with massive shotcrete.

The owner, the work supervision director, and the contractor composed the team organizational charts. The work supervision director is the representative of the owner at all construction stages, and their only restriction of power is on changes that are made during the construction work, which involved changing costs. Thus, monitoring this work and to check the work, it also authorized if the adjustments and/or adaptations to the design are or aren't executable. The supervision team was small but adequate and effective, and composed by work supervision director, which had the support of an experienced health and safety and (where necessary) a geologist.

Since the work involved a rock mass, the interventions described in the project were decided based on geological maps. However there is always a probability of changes when one passes to reality, since the mass is in constant change (the action of erosive agents), and there finds a possibility of updating the charts. This was a situation that was foreseen in the contract documents, and thus was required that there was a permanent monitoring of works by the designer, or by an engineer skilled in the art (adopted situation in construction, by a supervisor direction which was also a geotechnical engineer), which ensures that the consistency of the solutions adopted during the work.

During the execution of the work, there was only one work stop. Some changes were made with proper approval and authorization of the supervisor director. Still, the work was performed within less planned, the costs have been fulfilled, and the work had the quality required by the client.

The analysis revealed that supervisor work contributes to execute the work within the time and costs planned in accordance with the criteria quality required by the owner.

VI – CONCLUSION

Several technicians, according to the type and extent of work, should form supervision team, with the objective to form a team that is economically competitive and that accomplishment his work with the expected quality.

The supervisor must maintain an interaction with the areas of quality, safety and health work and the environment. The inspection should work (when necessary) with technicians trained in these areas, such as the health and safety coordinator, or an environment technical. However, the supervisor should not be replaced in any situation, for those entities.

Thus, there are two possibilities: supervising responsible for control of only some aspects, such as the work quality or the safety and health, or supervising responsible for managing the entire project. In the first situation there is a higher authority (hierarchically) responsible for coordinating the review of this and all other activities related to the project (contractors, document control, environmental control, suppliers, ...). In the second case the supervisor director accepts this coordination. Here, the supervisor assumes the role of project manager that include coordination and harmonization of the various phases of the work. Whatever the size of the supervising action, it must be explicitly defined in the specifications.

Supervisor must take a proactive behavior at work, which promotes the control of all stages of preparation and execution of work according to a plan, and reach the ultimate goal of development: the creation of the product by checking the specifications clauses, regulations imposed by meeting the requirements of the client (owner).

This dissertation is a contribution to clarifying the functions, the responsibilities and the objectives of the supervisory body in order to enhance and encourage their intervention as a means to guarantee the quality of the work. That is, that a rigorous and professional supervising is equal to an effective management of the planned. In other words, gives to the project a bigger opportunity to avoid cost, deadlines and resources deviations. With the aim of optimize their

action, the supervisor intervention must be done from design phase until the project's definite delivery, in other words, the supervisor must interfere in all of the project construction. In this period supervisor must manage and control the cost and resources, as well should guarantee the works quality, the minimum request for secure and health and the minimization of environments impacts.

Theoretical exposure induces that sooner supervisor is called to intervene in the construction work, greater is the probability of compliance with the specifications. The constitution of the supervision team ensures the multifaceted intervention in the management of the same work. It is the supervisor that should be involved in satisfying the responsibilities of the requirements and/or customer needs. In this way, the role of supervising takes the position of surroundings manager (the interests of the owner of the work, contractors).

This theoretical approach can only be proven with the analysis of case studies.

In the case study, Stabilization sea cliff Ericeira north of ISN, it was evident that a strict and a professional supervising in the construction of a new project amounts to an effective management plan, giving to the project a greater probability of no cost deviations in deadlines and planned resources, ensuring quality throughout the construction process and the final product itself (the work).