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THE MANAGEMENT OF TECHNOLOGICAL CONSTRUCTION DESIGN

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The acquisition of a constructed facility usually represents a major capital investment, whether its owner happens to be an individual, a private corporation or a public agency. Since the commitment of resources for such an investment is motivated by market demands or perceived needs, the facility is expected to satisfy certain objectives within the constraints specified by the owner and relevant regulations.

1. Essentially, a design is conceived to meet market demands or needs in a timely fashion. Various possibilities may be considered in the conceptual planning stage, and the technological and economic feasibility of each alternative will be assessed and compared in order to select the best possible design.

After the goal of the design is clearly defined, detailed engineering design will provide the blueprint for construction, and the definitive cost estimate will serve as the baseline for cost control. In the obtaining and construction stage, the delivery of materials and the erection of the design on site must be carefully planned and controlled. After the construction is completed, there is usually a brief period of start-up or shake-down of the constructed facility when it is first occupied.

Clients must recognize that there is no single best approach in organizing design management throughout a design's life cycle. All organizational approaches have advantages and disadvantages, depending on the knowledge of the owner in construction management as well as the type, size and location of the design.

When an owner decides to seek professional services for the design and construction of a facility, he is confronted with a broad variety of choices. The type of services selected depends on a large degree on the type of construction and the experience of the owner in dealing with various professionals in the previous designs undertaken by the firm.

2. Generally, several common types of professional services may be engaged either separately or in some combination by the owners.

Traditionally, the owner engages an architectural and engineering (A/E) firm or consortium as technical consultant in developing a preliminary design. After the engineering design and financial arrangements for the design are completed, the owner will enter into a construction contract with a general contractor either through competitive bidding or negotiation.

The general contractor will act as a constructor and/or a coordinator of a large number of subcontractors who perform various specialties for the completion of the design. The A/E firm completes the design and may also provide on site quality inspection during construction.

Thus, the A/E firm acts as the prime professional on behalf of the owner and supervises the construction to insure satisfactory results. This practice is most common in building construction. This traditional approach has become less popular for a number of reasons, particularly for large scale designs. The A/E firms, which are engaged by the owner as the initial professionals for design and inspection, have become more isolated from the construction process. This has occurred because of pressures to reduce fees to A/E firms, the threat of litigation regarding construction defects, and lack of knowledge of new construction techniques on the part of architect and engineering professionals. Instead of preparing a construction plan along with the design, many A/E firms are no longer responsible for the details of construction nor do they provide periodic field inspection in many cases. As a matter of fact, such firms will place a prominent disclaimer of responsibilities on any shop drawings they may check, and they will often regard their representatives in the field as observers instead of inspectors.

Thus, the A/E firm and the general contractor of a design often become antagonists who are looking after their own competing interests. To carry this protective attitude to the extreme, the specifications prepared by an A/E firm for the general contractor often protects the interest of the A/E firm at the expense of the interests of the owner and the contractor.

3. In recent years, a new breed of construction managers (CM) offers professional services from the beginning to the completion of a construction design. These construction managers mostly come from the ranks of A/E firms or general contractors who may or may not retain dual roles in the service of the owners. In any case, the owner can rely on the service of a single first professional to manage the entire process of a construction design. However, like the A/E firms of several decades ago, the construction managers are appreciated by some owners but not by others. Before long, some owners find that the construction managers too may try to protect their own interest instead of that of the owners when the stakes are high.

Builders who supervise the execution of construction designs are traditionally referred to as contractors, or more appropriately called constructors.

The general contractor coordinates various tasks for a design while the specialty contractors, such as mechanical or electrical contractors, perform the work in their specialties.

Material and equipment suppliers often act as installation contractors; they play a significant role in a construction design since the conditions of delivery of materials and equipment affect the quality, cost, and timely completion of the design.

The function of a general contractor is to coordinate all tasks in a construction design. Unless the owner performs this function or engages a professional construction manager to do so, a good general contractor who has worked with a team of

superintendents, specialty contractors or subcontractors together for a number of designs in the past can be most effective in inspiring loyalty and cooperation.

The general contractor is also knowledgeable about the labor force employed in construction.

Specialty contractors include mechanical, electrical, foundation, excavation, and demolition contractors among others. They usually serve as subcontractors to the general contractor of a design.

In the design life cycle, the influence factors affecting the outcome of the design often reside at the early stages. At this point, decisions should be based on competent economic evaluation with due consideration for adequate financing, the prevalent social and regulatory environment, and technological considerations.

Architects and engineers might specialize in planning, in construction field management, or in operation, but as design managers, they must have some familiarity with all such aspects in order to understand properly their role and be able to make competent decisions.

The clients have much at stake in selecting a competent design manager and in providing her or him with the authority to assume responsibility at various stages of the design regardless of the types of contractual agreements for implementing the project. Of course, the design manager must also possess the leadership quality and the ability to handle effectively intricate interpersonal relationships within an organization.

4. The ultimate test of the education and experience of a design manager for construction lies in her or his ability to apply fundamental principles to solving problems in the new and unfamiliar situations which have become the hallmarks of the changing environment in the construction industry.

When the investment is finished, each of the participants at the design will conduct a series of evaluations consisting of classifying the information collected during the execution of the works.

The information and the estimations allow making an evaluation of the design, dealing with both the good parts as well as with the deficiencies; this process is beneficial for future designs.

The evaluations are conducted by all the participants and for all the stages of the design. It is recommended that the information is stored in different files containing the most important sections, as follows:

- a) the quality of the preliminary activity;
- b) observing the time schedule and the causes of delaying or accelerating the activities;
- c) the estimation of costs (the design's budget), the monitoring of the costs and the reasons that lead to savings or outrunning it;
- d) the amount of modifications, their causes, origins and explanation;
- e) the quality, specialization and character of the staff;
- f) the sub-contractors and suppliers' performances and deficiencies;
- g) issues regarding the safety of the works;

- h) possible accidents, petitions, prejudices and damages;
- i) productivity;
- j) site issues: errors, infiltrations, transport, assemblies, samples, tests, neighbours, access, etc.;
- k) quality control;
- l) the relationships between the participants;
- m) notices, inspections, controls, penalties;
- n) misunderstandings, conflicts;
- o) using the fund for unforeseen situations;
- p) the quality of the documentation, completions, reconstructions and modifications;
- q) the method of measurement and the payment for the activities performed.

All these evaluations are included in the data base of each participant and they are elements for defining the lessons learnt or facts to beware of or valuable elements for future designs.

5. Improvement of design management not only can aid the construction industry, but may also be the engine for the national and world economy.

However, if we are to make meaningful improvements, we must first understand the construction industry, its operating environment and the institutional constraints affecting its activities as well as the nature of design management.

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REFERENCES

1. Dale B.G., *Managing Quality*. Prentice Hall, Herts, 1994.
2. Hagiu V., Șerbănoiu I., *Organizarea și conducerea lucrărilor de construcție*. Inst. Politehnic, Iași, 1986.

CONDUCEREA PROIECTELOR TEHNOLOGICE DE CONSTRUCȚII

(Rezumat)

Realizarea unei construcții reprezintă, de obicei, o investiție capitală, fie că beneficiarul se întâmplă să fie un individ, o corporație privată sau o agenție publică. De vreme ce este nevoie de o asemenea cantitate de resurse pentru a realiza investiția, este normală stabilirea unor principii economice de realizare a acesteia.