

## **CIVIL ENGINEERING PROJECTS REALIZATION MANAGEMENT**

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**Abstract.** *The paper treats the management of the realization of civil engineering projects or civil engineering buildings construction management, as a complex dynamic process, which entails a large number of strategic and operative decisions which are important for an efficient, cost effective, and economic construction. The management process execution is not possible without the functions such as planning, organizing, coordination and control. Planning, as the initial function, important for the forecast of the future events, tasks and goals, is rendered much simpler by the application of computers and software packages. Such software packages facilitate the integral management, planning, realization, as well as control of the course of realization of civil engineering projects, that is the entire course of civil engineering buildings construction. The most frequent programs in this application are the Scheduler, Prima Vera and Project. The experience acquired in the application of these software packages has shown that the best results in civil engineering have been attained by the software package PROJECT 2003.*

**Key words:** *Project, software packages, management process, organization project and building technology.*

### 1. INTRODUCTION

Starting from the fact that the realization of civil engineering projects or construction of civil engineering buildings is a very complex dynamical process, affected by an extremely large number of factors which are constant or stochastic in character, it can be stated that the structure realization, that is construction, is possible only with making timely and correct decisions, and with adoption of most efficient methods and ways of management and realization.

According to the previous statement, the management of the realization of civil engineering projects that is management of building construction, is regarded as a dynamical process of decision making, about the activities which improve the functioning and devel-

opment of civil engineering production, as a macro system, having in mind the available scope of relevant information. The management is performed through the realization of four basic functions, which are: planning, organization, coordination and control.

Planning is the basic initial function which determines the goals, tasks, plans and programs, but also the strategic decisions and ways for their most efficient realization. In its essence, the goal of planning is to forecast the future events (those that can be acted upon; those that can be partially acted upon and those which can be acted upon in distant future).

Organization as a function has a goal of creating and shaping of the appropriate realization or organizational system with the appropriate structural elements, which is capable to realize, in an optimal way, the planned goals and tasks, formed by the planning.

Coordination as a function has a goal to direct and connect the elements of organizational system. In essence, it can be regarded as the operational management when performing or putting into practice the planned goals and tasks.

Control as a function has a goal to perform control of the results obtained on the basis of the action of the organizational system, by the realization of the adopted decisions, goals, tasks. It controls the regularity of usage or consumption of the engaged resources, labor, finances, so it is regarded at the same time as a means of feedback recording, and of collecting information important for the decision making process.

Management of civil engineering projects can have different aspects, primarily informational, organizational, economic, production-technical but also social.

A successful management of civil engineering projects realization requires knowledge of the civil engineering production, its complexity and specifics in respect to other kinds of production. The basic specifics of the civil engineering production reflect in uniqueness and character of work; in kind and dimensions of civil engineering buildings regarded as the results of work; in the final products being inseparable from the location; in the universality and mobility of the capacities; in the action of variable climate-meteorological, topographic, geological-geomechanical, hydrological and other conditions.

## 2. BUILDING CONSTRUCTION AND TECHNOLOGY PROJECT – BASIS OF CIVIL ENGINEERING PROJECTS REALIZATION MANAGEMENT

Civil engineering projects realization management or building construction management requires making timely and correct decisions which bring about high efficiency, cost effectiveness, economy and productivity of civil engineering production in the conditions of significant instability or stochastic character of execution. In this way the action of destabilizing factors is forestalled and the building production is increased; the higher stability and accumulation capacity are increased; the quality of construction is improved; the construction time is decreased; the working conditions are improved; the construction works are increasingly automatized and mechanized and the professional skills and qualification levels of the construction workers are enhanced. Attainment of these goals is only possible if the building construction is organized on the basis of the scientific construction organization, on the basis of the contemporary methods and technologies, contemporary planning methods, in one word, on the basis of quality preparations of construction works. All the mentioned basics ought to be taken into consideration and incorporated in the

contemporary building construction and technology projects, which should include an integral research of the construction situation or conditions; and integral study of the technological processes; planning; optimization and adequate dimensioning of the production and storage facilities, temporary communication lines (roads), infrastructure network, etc. The static and dynamic planning has a central place in the construction organization and technology projects. It is effected through the application of contemporary methods of static and dynamic planning with the wide application of computers and modern program packages such as Project; Prima Vera, Scheduler, etc.

All these programs make the integral project management possible, that is, they offer great options in directing and coordination of the activities, resources and construction time in the course of building construction.

The fundamental issue of all the programs is that they facilitate the time planning of a project (figure 1); control, adjustment of resources and control of expenses.

In the framework of time planning and project duration, they arrange the activities; improve and update the network; control the network serviceability; network numbering; calculation of time parameters and appropriate reserves regarding the duration of activities and the adopted timetable. The time planning reports are given in the form of tabular and graphic representations of network plans, bar graphs of network plans, engaged labor, machinery and finances histograms. During control and adjustment of resources, they distribute and monitor a large number of resources according to the activities and provide their optimal usage. Out of the reports referring to the control and adjustment of resources, they provide the appropriate histograms of really used and adjusted resources in the form of the dynamic usage plans of the researched resources.

In the field of calculation and control of costs, they automatically calculate the finances by the activities, and cumulative. From the reports related to the costs, they produce the appropriate histograms of costs and tabular reports about expenses by days, weeks, months and years (upon request).

The experience in application of some program packages such as Scheduler, Prima Vera and Project, have shown that the contemporary requirements of civil engineering production finds the program package Project 2003 the most suitable from various reasons, the most important being: quick access to all the program elements ( activities; resources; course, reports); simple entry of the required data; quick and automatic calculation of all the changes entered during the processing; simple adjustment of resources; quantity of work or time duration of an activity; simple management with known connection (SF:SS:FF) with the known types of activities with estimated duration; with fixed units; or with fixed work; easy usage of the most of activity combinations wit the fixed quantity of work (intensity); for instance the activities with the fixed units in the fixed quantity of work-intensity; activities with fixed units; activities with fixed work in fixed quantity of work – intensity; activities with fixed duration; activities with fixed duration in fixed quantity of work – intensity. For instance, the program package Prima Vera utilizes only four combinations, and those are: activities with fixed units in fixed quantity of work – intensity; activities with fixed units/time; activities with fixed units; activities with fixed duration and units; activities with fixed units and units/time.

Apart from other things, one should point out that the reports are well conceived and organized.

## 3. CONCLUSION

Fast and efficient construction of civil engineering structures is nowadays hardly feasible without the organization and building technology projects, which include all the relevant elements of work which are important for the economical and cost-effective building. One of the most important elements of the organization and building technology projects is the planning itself, as the essence of civil engineering projects management, that is, building construction management. The complexity of civil engineering projects, and production, with a lot of participants – activities and with a lot of factors connected to the material-energy resources; mechanization and equipment; labor and working conditions renders the planning itself very complex. That is why the application of computers and software packages: accelerates the planning process by many times; makes quick comprehension of risk factors possible; directs attention to important activities or works which to the highest degree define the rhythm of construction; creates the conditions for making the strategic and operative decisions which are important for management and control of the works being realized.

In the contemporary world, there is a large number of software packages which can be applied, the most significant being the Scheduler, Prima Vera and Projects. All these software packages serve the same purpose of planning the construction or realization of civil engineering projects; to create the conditions for making the correct and timely strategic and operative decisions important for the reliable management with the projects realized by the construction companies during the civil engineering structures building. These programs are used for the standard and special calculations related to the rational exploitation of the available resources and their distribution to the facilities or construction sites. According to the experiences so far, such requirements are best met by the software package Project 2003. It is certain that a symbiosis of this software package with the programs from the field of 3-D graphics would yield the best calculation and visual effects in the field of civil engineering projects realization management.

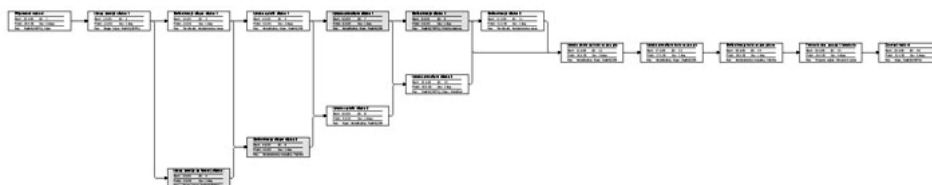


Fig. 1. Network diagram for a bridge construction

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## UPRAVLJANJE REALIZACIJOM GRAĐEVINSKIH PROJEKATA

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*U radu se upravljanje realizacijom građevinskih projekata ili upravljanje izgradnjom građevinskih objekata, posmatra kao složeni dinamički proces, vezan za donošenje velikog broja stratejskih i operativnih odluka od značaja za efikasno, racionalno i ekonomično građenje. Ostvarivanje procesa upravljanja nije moguće bez funkcija kao što su planiranje, organizovanje, koordinacija i kontrola. Planiranje kao inicijalna funkcija, od značaja za sagledavanje budućih događaja, zadataka i ciljeva, mnogostruko se olakšava primenom računara i računarskih paketa. Ovakvi računarski ili programski paketi omogućavaju integralno upravljanje, planiranje, realizaciju, ali i kontrolu toka realizacije građevinskih projekata, odnosno toka izgradnje građevinskih objekata. Od brojnih programskih paketa na računarskom tržištu, najveću primenu imaju Scheduler, Prima Vera i Project. Iskustva stečena u primeni ovih programskih paketa su pokazala da su najbolji rezultati u građevinarstvu postignuti programskim paketom Project 2003.*