

# **A CONTROLLING APPROACH FOR IMPROVING DECISION MAKING AND PLANNING IN CONSTRUCTION MANAGEMENT**

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## **ABSTRACT**

The paper represents a controlling approach based on the idea to focus the efforts not on costs and scheduling, rather the planning and decision-making procedures should be the main subject of the controlling.

To realize the controlling the function “coordination” is essential. Furthermore an understanding of the planning and decision-making procedures as complex systems is necessary. Finally instruments are needed to accomplish this task in practice.

## **KEY WORDS**

Planning and decision making, controlling, complex systems

## **INTRODUCTION**

In construction management, planning and decision-making procedures are carried out every day. Several kinds of decisions in the project-phases can be differentiated.

Planning and decision making these days is more difficult than ever. On the one hand more specialists than before take part in the management of construction processes. On the other hand new forms of contracts are increasingly applied to accomplish construction projects (Racky 2004).

In practice of construction management decision making often is done by intuition. Because of the complexity characterizing the task of planning and decision making it is recommendable to ask for more systematic structure and methodology in planning and decision-making procedures.

Considering these aspects it is necessary to improve the management-concepts as well as the offered management-tools. In order to reach a better standard in this sense we suggest a controlling approach to support the planning and decision-making processes.

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## **MOTIVATION FOR A CONTROLLING APPROACH IMPROVING PLANNING AND DECISION MAKING IN CONSTRUCTION MANAGEMENT**

The subject of construction management is to plan and control the construction processes. The main target of these management procedures is to accomplish the building project right in time and according to the estimated costs. On the one hand the project management has to reach this project targets. On the other hand the economic vitality of the construction firm has to be considered well. The project objectives “time scheduling” and “cost control” can be called “operative aims” and the economic vitality of the enterprise has strategic character.

The difficulties in management consist in considering these expectations connected with dynamic changes as characteristics of several parameters. For example prizes of materials can change significantly during the project time; prizes of steel and oil for instance increased during the last years significant. For a construction project it is typical, that the realization of a construction method is more difficult than it was planned. Such typical cases can base on several reasons, and furthermore several problematical consequences for the following developments of a project are possible. Such difficulties can disturb the time scheduling, and also the costs can increase. Another task of construction management referring to these difficulties is the coordination of the separate subcontractors and the construction processes they have to carry out.

Accomplishing these challenges this paper tries to develop solutions improving the construction management work, especially the planning and decision-making procedures. In the practice of construction management it can be recognized that many decision-making processes are characterized by intuition – although there are several methods developed in economic, management and construction-management sciences to accomplish questions of planning and decision making in a systematic and structured performance.

In fact, a number of different methods and management concepts were developed to improve planning and decision making. “Operations research” is a general term for a lot of different mathematical methods like time-scheduling methods or simulation methods and other methods, suitable for questions of planning and decision making in construction management as Schopbach (2001) demonstrated. Although time-scheduling methods are a standard planning method in construction management, simulation in construction management is still a technical invention; an application for a practical use is not accepted until yet (Chahrour et al. 2005).

But indeed, even in practice efforts to improve management processes are realized as well as quality-management systems, risk-management systems or knowledge-management systems are implemented to perform system and structure in management. But it is insufficient if each system works independent and follows its own objectives.

The suggestion of this paper to improve the described situation bases on an idea of controlling developed in German management sciences. Comparing the German “controlling” with the English or American “management accounting”, most of the German authors, e.g. Horváth (2003), define “coordination” as an essential controlling function.

Coordination connected with the other significant controlling-task, the support of decision making, offers the ‘controlling’ as a appropriate part of management to improve systems and structures.

In this sense controlling has to create systems and structures which should be able to anticipate coming developments.

As well as the management accounting attempts to find out the monetary development of a project, the so called “decision oriented controlling”, as the controlling-concept of this paper, endeavors to detect the results of decisions which possibly may happen.

## **CHARACTERISTICS OF THE PLANNING AND DECISION PROCEDURES**

Several significant aspects are characterizing the planning and decision-making procedures. One aspect is the fact, that decisions have different consequences on other decisions. That means prior decisions determine other, following decisions. Therefore it is recommended to differentiate the decisions according to their consequences for other decisions. We can say, there is a hierarchy of decisions. These interdependences between the several decisions should be considered well to understand the whole planning procedures. Considering the whole planning procedures and transparency of the connections between the decisions should characterize the proceedings of planning.

While the hierarchy of decisions is one factor of complication, another factor is the structure of the participants. In this sense it is necessary to know which persons are concerned by a decision and which persons can support the planning process with useful information. A dilemma is the fact that people in the upper hierarchy of management have more competence in decision making, but less information in detail of the relevant question of planning (Zilch et al. 2002).

These organizational aspects of planning and decision making in a construction project are especially interesting, because the participants of such a project possibly can change during the project time; even from one project phase to a following project phase the responsibilities can change. For example, the responsibilities for estimating the offered prize of a construction project and for accomplishing the works on site are taken by different persons or departments of a firm.

Complication of a project and also of its planning and decision procedures increases because there are more participants in a project than in the past. On the one hand more subcontractors than before take part in a project and on the other hand project management companies on behalf of the building owner show the increasing number of persons being involved in a project.

The daily work of the construction management gets more complicated because of the following demands:

- less time than before to accomplish a project
- more different forms of contracts
- increasing number of laws, for example industrial law

According to this increasing complication it is necessary to improve the support of the construction management. Therefore we suggest the controlling approach described in the following.

Figure 1 shows the connections of the difficulties characterizing the tasks of planning and decision making and the conceptual aspects of the approach to accomplish these tasks. The conceptual aspects consist of principles as well as functions and instruments of controlling.

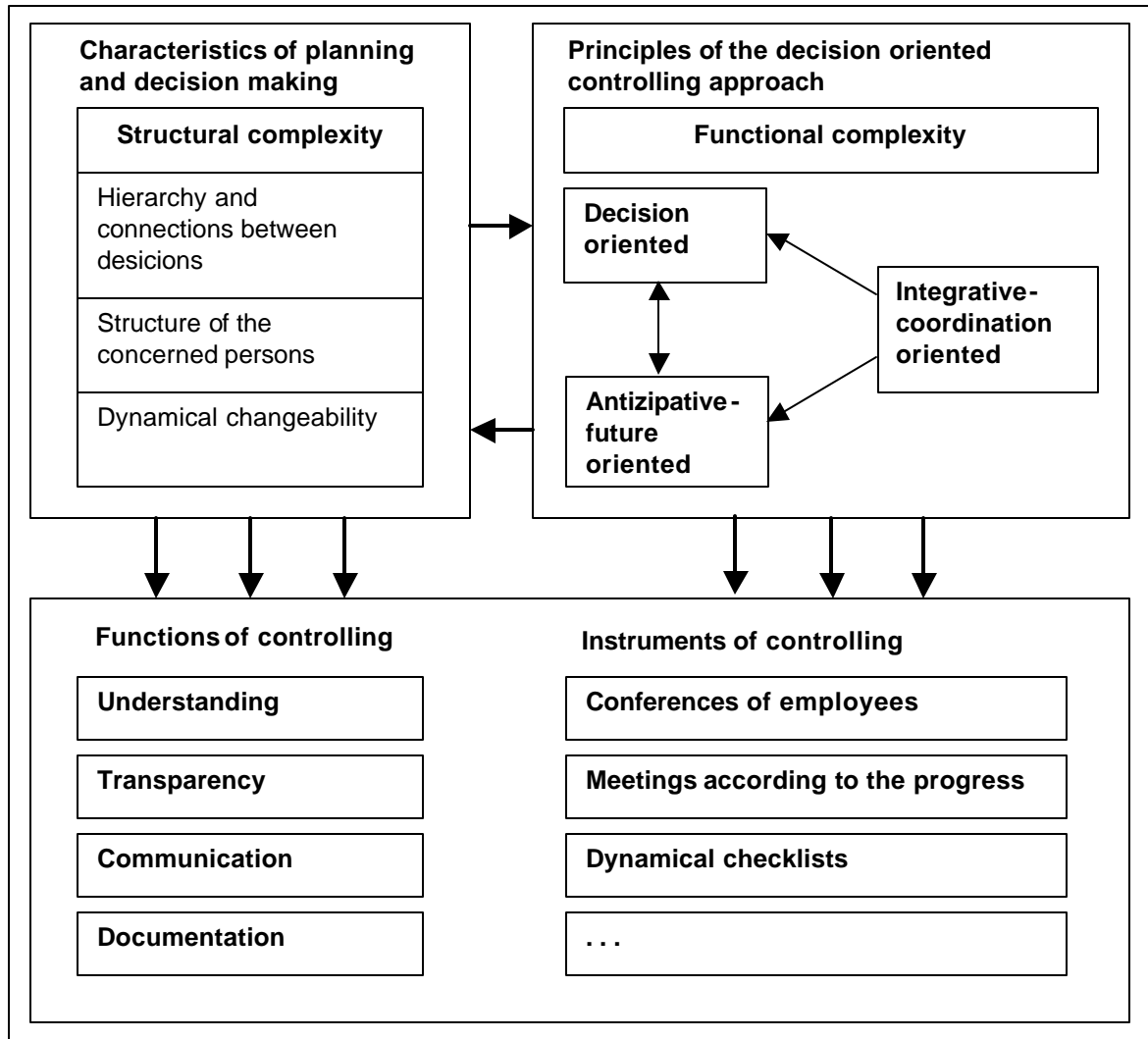


Figure 1: Connections of characteristic of planning and decision making and conceptual aspects for accomplishment

### THE DECISION-ORIENTED CONTROLLING APPROACH

To develop the approach the whole planning and decision process is understood as a “system” according to “system theory”. Haberfellner et al. (1997) consider “Systemdenken”/”thinking in systems” as a way of thinking to improve the understanding of systems as complex phenomena and to be able to organize them as complex systems. If we consider the

whole planning and decision processes of a construction project as a system, we ask for the structure of the system. A special structure of systems, consisting of elements and relations between the elements, helps to control the system, so that special and desirable developments of a system will be probable (Kirchhof 2003).

Complex systems are characterized by „complexity“. “Complexity” means especially that systems are characterized by complicated connections and dynamic changes (Schmidt 1992).

To perform and organize complex systems, “complexity” and its forms are considered to describe the significant character of such systems like the planning and decision-making processes. It can help to understand the difficulties and to improve the performance of the systems.

Significant for our approach is the differentiation of the appearances of “structural complexity” and “functional complexity” (Kirchhof 2003).

Structural complexity is coming out by interaction between the several elements and between the elements and the surrounding. There are three parameters of structural complexity:

- complexity of the elements (multiplicity and variety of the elements)
- complexity of the relationships
- dynamic changeability of the elements and of the relationships between them

Especially structural complexity helps to understand the connections of the planning and decision-making processes and to support transparency.

Functional complexity means the ability of variations of the system and especially of the involved persons as elements of a system like planning and decision-making processes. In this sense functional complexity consists of the abilities to find a solution for the difficulties of structural complexity.

To support the activities of planning and decision making in construction management we suggest a special performed controlling, that is able to recognize the structural complexity of the planning and decision-making processes and also to organize the functional complexity to improve the management procedures.

Therefore the controlling should be characterized by three principles:

- **Anticipative-future oriented:** The controlling should try to anticipate future developments to consider them in planning and decision making. Especially “anticipative” means to see future developments and try to exert influence on it. With other words, the ability to identify the coming developments to lead them into a desirable direction. The approach follows the idea of “feedforward-control” (Link 1996), that means the input of procedures must “be controlled” before the output. To be able to realize anticipative-future oriented controlling the principle “decision oriented” has to be considered well.
- **Decision oriented:** The subjects of controlling should not be costs and prizes. To anticipate the monetary parameters the questions of planning and decision making, which finally affect on the monetary parameters, should be taken in the focus of the

efforts. Furthermore, other parameters responsible for the success of the project like qualities and scheduling can be influenced on this way in an early state.

With that the “coordination of planning and decision making” represents an essential function of controlling. As well as the aims of planning are subjects of controlling, also the participants on decision making are subjects of controlling. So, the third principle characterizes our suggested controlling.

- **Integrative-coordination oriented:** To support the principles “anticipative-future oriented” and “decision oriented” the controlling should take care on this third principle as well. “Integrative-coordination oriented” means that controlling aims on integration and coordination of the several management systems, coordination of the targets, activities of the several management systems and integration according to a generally management concept of the firm.

Because of the existent and recognizable management structures in the construction firms our controlling approach aims first of all on the behavior of the concerned people, the participants of planning and controlling. The situation only can be improved, if they get a consciousness about the connection and coherences about planning and decision making. For improvement the planning and decision making is defined as one target of the whole organization of the construction firm.

To reach these improvements, we suggest a method to criticize the planning and decision-making procedures. It should help, the participants reflect their behavior and activities in planning and decision making, to identify weaknesses and to create improvements.

## **METHOD TO CRITICIZE THE PLANNING AND DECISION-MAKING PROCEDURES**

The method differentiate between criticizing the organization of the planning and decision-making procedures in general and criticizing the proceeding to accomplish a special case of planning and decision making.

Critique of planning and decision-making procedures generally focuses on the performance of structures and management systems. The performance of structures and management systems is considered as ‘general rules’ of a organization. Proceedings to accomplish special decision cases needs methods to detect solutions for detailed planning-aspects according to the general rules. In an iterative procedure the general rules should be checked and improved.

The essential aspect for planning and also criticizing planning procedures is to generate communication between the participants. This is important for a successful development of the methods and proceedings because of the essential aspect that the experiences of the employees and their ability to see coming developments and challenges of a project is a valuable repertoire of knowledge and know-how.

Considering this aspect several instruments (measures and methods) are suggested to accomplish this controlling task. The instruments have different character:

- **Conferences of employees:** At conferences of employees current and finished projects should be the subjects of discussion. The presentation of a project and

special planning problems has several advantages. On the one hand the participant of a project, who presents the project is motivated to consider the project and the questions with high intensity and to reflect it. On the other hand the participants on the project can get valuable information from their colleagues. Furthermore, all employees taking part in the conference can get useful information and ideas for their project and coming challenges.

- **Meetings according to the progress of the project:** According to the progress of the project special meetings should be realized to assure that important information will be passed on. Results of the discussion of the conferences of employees should be considered at the meetings. Otherwise difficult questions can be identified to discuss in a next conference. On the meetings it must be guaranteed that the necessary information is available and methods are well known to inspect special questions of planning.
- **Dynamic checklists:** Dynamic checklists help to give and to get information in a fast way. Due to electronic data systems and e-mail it is possible to send the checklists in a short time to other employees. Questions of planning in construction management can be discussed this way without calling to a conference or a meeting. There are a lot of possibilities to perform such a dynamic checklist, it depends on the kind of problem and on the function of the sender of the checklist. It is possible that the sender wants to give information or to get information.

As an essential effect of this methods and activities the know-how and the knowledge of the organization will be improved.

It is a function of controlling to encourage the conferences and meetings and assure the documentation. Furthermore, it is important to distribute the documentation (information support) and evaluate the communication proceedings. By interactions with the managerial staff of the projects the quality of information support will increase steadily. Another advantage is that the controlling can get a good view about the knowledge, know-how and capabilities of the several employees.

To consider the principles of the decision-oriented controlling approach and to fulfill the controlling functions further instruments can be develop. Each controlling concept in practice is to adapt on the individual situation. It depends on the circumstances of the several firms as well as of the several projects.

In this sense it is the essential part of controlling to develop, improve and coordinate systems to accomplish the planning and decision-making tasks, based on the principles of the decision-oriented controlling approach.

## CONCLUSIONS

The planning and decision making in construction management is considered as complex systems. This characteristic structural complexity represents challenges to accomplish by the construction management.

Therefore a controlling approach is developed based on the principles “anticipative-future oriented”, “decision oriented” and “integrative-coordination oriented”. To realize controlling

in practice the approach defines “controlling functions”, which have to be performed and “controlling instruments” for concrete application are suggested.

But of course, the use of a controlling concept in practice, based on the principles of the decision oriented controlling approach, should be adapted to the individual situation.

## REFERENCES

- Chahrour, R., Utsch J. H., Franz, V. (2005) *Computersimulation im Baubetrieb – Wege zur Innovation*. Tagungsband 18. ASIM Symposium Fortschritte in der Simulationstechnik, SCS Publishing House e.V. Erlangen, pp. 548-553.
- Haberfellner, R., Nagel, P., Becker, M., Büchel, A., von Massow, H., Daenzer, W. F. (Hrsg.), Huber, F. (Hrsg.) (1997). *Systems Engineering*. 9. Auflage 1997, ergänzt mit dem SE-Wissensbaum von Dr. Mario Becker. Orell Füssli Verlag, Zürich, für Verlag für Industrielle Organisation, Zürich.
- Horváth, P. (2003). *Controlling*. 9. vollständig überarbeitete Auflage. Verlag Franz Vahlen GmbH, München.
- Kirchhof, R. (2003). *Ganzheitliches Komplexitätsmanagement. Grundlagen und Methodik des Umgangs mit Komplexität im Unternehmen*. Dissertation Technische Universität Cottbus, 2002. Deutscher Universitäts-Verlag GmbH, Wiesbaden, 2003.
- Link, J. (1996). *Führungssysteme: strategische Herausforderung für Organisation, Controlling und Personalwesen*. Verlag Franz Vahlen GmbH.
- Racky, P. (2004). 3. *IBW-Symposium, 17. September 2004 an der Universität Kassel. Partnerschaftliche Vertragsmodelle für Bauprojekte*. kassel university press GmbH, Kassel.
- Schmidt, D. (1992). *Strategisches Management komplexer Systeme : die Potentiale computergestützter Simulationsmodelle als Instrumente eines ganzheitlichen Managements – dargestellt am Beispiel der Planung und Gestaltung komplexer Instandhaltungssysteme*. Stuttgart, Univ., Diss., 1991, Verlag Peter Lang GmbH, Frankfurt am Main 1992.
- Schopbach, H. (2001): *Ansätze zur Kostensenkung in Konstruktion und Baubetrieb durch Einsatz mathematischer Optimierungsmethoden*, Dissertation am Institut für Bauwirtschaft der Universität Kassel 2001, kassel university press GmbH, Kassel 2002
- Zilch, K., Diederichs, C.J., Katzenbach, R. (2002). *Handbuch für Bauingenieure*. Springer Verlag, Berlin, Heidelberg, New York 2002.