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Quantification of influencing factors for planning performances in pre-design and design stage

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Abstract

The processes for planning and construction of buildings, with whose control and optimization the project management deals primarily, are characterized by high complexity. This complexity is based on the uniqueness of every single building/project concerning its demands, basic conditions, etc. and also on the wide range of different project partners. Beside the clients the planners - architects and numerous technical planners of different fields - as well as construction companies play a central role. This inhomogeneous project team of highly diverse experts and competences as well as the influence of public authorities and societies has to be handled by the project manager. For that complexity, planning and construction processes are fraught with a high uncertainty. The aim of this study is to quantify the determinants of this complexity which in turn will enhance transparency and clarity for the parties involving in a project organization. Employing empirical methods - data collection of real comparison projects and statistical evaluations like regression analyses - the effects of different influencing factors on the emerging effort during planning and construction phases are investigated. Addressing cause-effect relationships between planning efforts/performances of designers and their determinants, not only the relevant influencing factors but also the level of influences for the pre-design and design stages are detected. The results of this study can serve as an analytical framework which enables project team to perform objective comparison between planning performances of different teams and to arrange the planning and constructing processes more transparent.

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1. Introduction

The construction project management handles with the control and optimization of the planning and construction of buildings. The processes, which have to be managed to accomplish this purpose, are characterized in their entirety by high complexity. The impetus of this complexity is the uniqueness of every single building/project concerning its demands, basic conditions etc. and the wide range of different participants involving in a building project (see Fig. 1). In German practice, architects and numerous technical planners of different fields including construction companies play a central role along with the clients. Role of the architectural office is to provide all planning services from the first draft to the construction, aided by the technical planners and implemented by the construction companies. The project manager, on the other hand, is responsible to administer this inhomogeneous team of highly diverse experts and competences as well as the influence of public authorities and societies. For that complexity, planning and construction processes are fraught with a high uncertainty.



Fig. 1. Influencing factor groups on planning and construction processes.

In this context, the ultimate aim of this study is to quantify the determinants of this complexity. Using empirical methods - data collection of real comparison projects and statistical evaluations like regression analyses - the effects of different influencing factors on the emerging effort during a planning and construction process are investigated. Focusing on architectural planning, cause-effect relationships between planning efforts/performances (measured in absolute hours) and their determinants are studied. Following, the relevant influencing factors as well as the level of influence for the project stages pre-design and design are detected. The remainder of this paper organized as follows: Section 2 outlines empirical and theoretical basis of the study, including topics such as introduction of variables. Section 3 reports properties of the sample. Section 4 compiles the main findings and discussion of the results. Finally, Section 5 summarizes concluding remarks.

2. Empirical and theoretical basis

2.1. Dependent variable (planning effort in pre-design and design stage)

In this study, the term “planning effort” is measured in absolute hours and defined according to the German Order of Fees for architects and engineers (HOAI). HOAI provides information on all services of architects and engineers relating to new buildings, new facilities, rebuilds, extensions, conversions, modernization works, room-creating interior works, maintenance and repairs. The services are summarized in nine service phases: establishing the basis of the project, preliminary design, final design, planning application, execution drawings, preparation for contract placement, assisting with contract placement, project supervision - supervision of construction and project management and documentation. The exact definition of all services included in the pre-design and design stage according the German HOAI is given in appendix A. In Germany, architectural services are legally regulated by the

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