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Impact factors on the cost calculation for building services within the built environment

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Abstract

Different building epochs, materials and styles challenge planners and furthermore executing companies to define the required services upfront. The presumptions made, often differ from the real conditions on site (building substance), so that additional investigations in advance would be helpful, to gain more knowledge on the existing structure. These deviations then demand additional services on site, which are usually not listed in the bills of quantities and lead to budget overruns. Clients can cushion such overruns through reserves in the budget, but how do contractors deal with those uncertainties in their calculation? To investigate if and how these risks of differing construction and site conditions affect their bids of contractors, quantitative research has been applied and a survey has been conducted. The trend shows, that not the cost component of labour work increases, but is calculated into the prices for materials in order to hide those additional costs. Uncertainties in construction works on existing buildings will always be difficult to evaluate. To minimize the risks of running an unprofitable construction site, employers have the possibility to work with a flexible budget, but contractors can only act to uncertainties and additionally required services with claiming.

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1. Introduction

Building in existing plays an increasingly important role in the construction industry. Decisive for this development are demographic changes, the public awareness of sustainable development as well as the application of energy-efficient, resource-friendly materials [1]. These structural changes in social, economic and environmental spheres have led to a decline of the volume of new construction in recent decades. At the same time there has been a significant increase of building activities in projects in the built environment and refurbishment of existing buildings. In view of these developments, both, principals and agents, must meet new demands in legal, technical, economic, political, planning, creative, social, cultural and aesthetic areas, which deal with building in existing.

This contribution provides an overview of the major internal and external factors that must be taken into account due to the above-mentioned developments of clients and contractors. In addition, the formation and building of the construction price is explained, as well as significant factors of the construction industry are described, which have a major impact on it. Moreover, the principles of the construction calculation, according to the Austrian Standard ÖNORM B 2061 „Price calculation for construction works" are explained, in order to get a better theoretical understanding about the costing in Austria.

As part of the contribution the influences of the identified factors on the calculation and pricing of contractors are investigated. Therefore, on the basis and the acknowledgements of the literature study, a questionnaire was developed and qualitative interviews with experts were carried out. The aim of the survey was to identify relationships between theory and practice and to survey how theoretical aspects are taken into account in the practical construction calculation and which cost units are most affected thereof.

The results show, that the identified factors from the literature analysis have a significant impact on the construction cost calculation. Especially the labour costs of building services in the existing increase due to many unpredictable events to large scales. The reason therefore is the fact that much of the work must be prevented by additional wage hours. Further affected cost units are the equipment costs or transport costs. The increased amount of cost plus services also often leads to additional costs in building in existing. In Summary, it can be stated that high savings potentials are possible by accurate qualitative planning and accurate tender documents.

2. Cost calculation

2.1. Basics and characteristics of cost calculation

Each cost calculation has peculiarities and has to be adapted for each project. Yet, there are several characteristics that can be applied in each calculation of a construction project and have significant impact on the result. In addition, there are different areas in which calculation principles can be distinguished and should be considered separately.

Regarding to Oberndorfer and Haring [2], the main characteristics that are common in every construction project are the following:

- Cost fairness vs. competition fairness
- The Pareto principle
- Time pressure
- Interest and chance of getting the contract

Additionally there are several factors and spheres that influence the calculation of the costs for building services in other ways. Those are:

- **External factors** : Including, Standards, laws, regulations, directives, collectively agreed conditions
- **Internal, operational factors** : Consisting of internal production factors, the internal cost accounting, personnel-, material-, machinery-, equipment costs, technical, organizational and economical Know-How and the post-calculation (determination of expense and service values) of finished projects [2].

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