



# XXVII FIG CONGRESS

11-15 SEPTEMBER 2022  
Warsaw, Poland

Volunteering  
for the future –  
Geospatial excellence  
for a better living

## Construction project management using digital models: construction cost estimation in early project phases

M.Sc. Sara Bender

Prof. Dr. Christian Stoy



ORGANISED BY



14-09-2022

PLATINUM SPONSORS



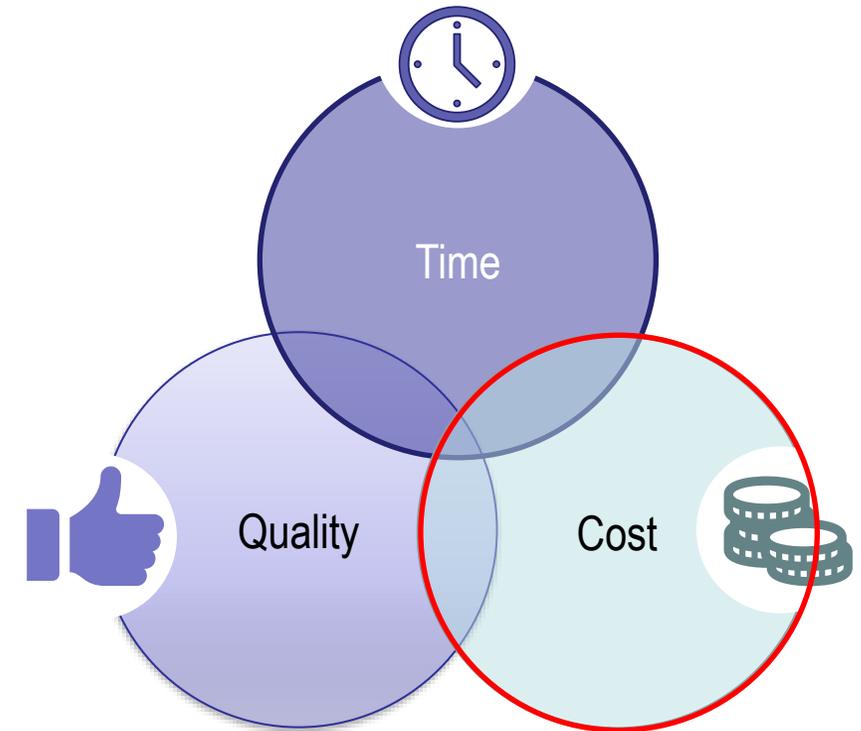
## Structure

- Introduction
- Cost planning
- Project example
- 5D Cost Planning
- Difficulties in the process flow

## Introduction

### Construction project management

- Time, costs, quality as mutual dependencies in the project
- Project management supports those three objectives
- Project planning as an iterative process in which participants develop, review and revise solution approaches



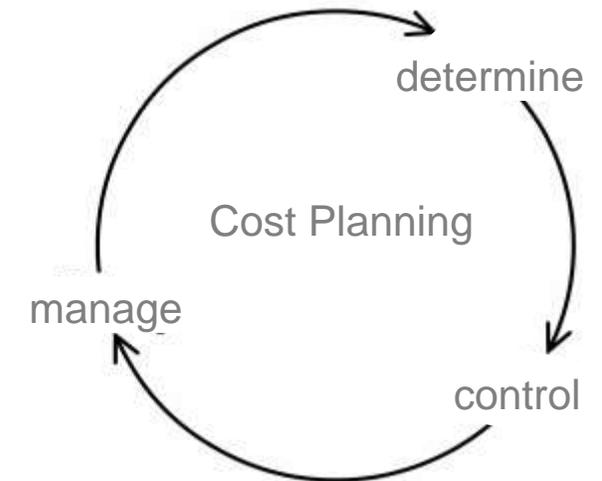
Own Illustration based on: Kinateder (2017)

## Introduction

### Cost Planning

= continuously and systematically across all phases of construction planning to determine, control and manage costs

- Cost planning also as an iterative process in Construction project management
- Main influence factors on costs are quantities and cost value



Own Illustration based on: Stoy (2017)

## Cost planning

- Cost Estimation is based on quantities and cost values

$$\sum \text{Quantity} \times \text{Cost Value} = \text{Total Costs}$$

- Quantities are the key factor to estimate costs
- Quantities must be determined carefully and comprehensibly
- Quantities can be planned or be pre-existing
- For existing buildings, quantity take-off can be challenging and time-consuming

## Project example: Conversion of an existing site

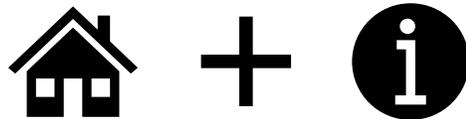


- Factory area for the production of oils and fats
- Conversion and expansion of existing buildings
- Existing quantities must be measured for the cost estimate
- The accuracy of the cost determination depends on the accuracy of the quantity take-off

Google Maps

## 5D Cost Planning

- Integrating cost planning in model-based work flow > Building Information Modeling
- 5D cost planning is connecting geometric information from a model with alphanumeric information



- Within the BIM method, cost determination can already be integrated very well in early project phases
- Cost determination in early phases is more element-oriented than execution-orientated
- Comprehensible cost determination is possible in early project phases

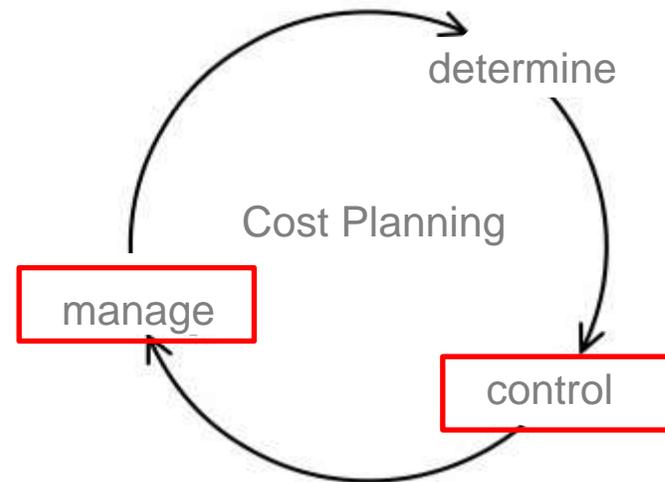
## Difficulties in the process flow

- Based on expert interviews an as-is process is compared to a target process
- The following process operations were identified:
  - Process difficulty = a process that does not run smoothly and requires additional effort, but the process can still be carried out in a model-based way
    - Software-based process difficulties
    - Data-based process difficulty

Software neutral exchange format  
Data quality  
Cross-interface software  
Lack of standardisation  
Information procurement and coordination
  - Process interruption = when a process component does not integrate the digital building model as a central source of information
    - Specialist planner model

## Difficulties in the process flow

- It is particularly notable that the cost planning process is not consistently carried out in a model-based manner



## References

Bender, Stoy (2021) Prozesslücken modellbasierter Baukostenermittlung aus ausgewählter Akteurskonstellation, Bauingenieur, Ed. 2021, No. 96, 2021.

DIN 276:2018-12 Kosten im Bauwesen.

Kinateder, T. (2017) Bauprojektmanagement. In: Rottke, N., Thomas, M. (eds) Immobilienwirtschaftslehre - Management. Springer Gabler, Wiesbaden.

Kochendörfer et al. (2021) Bau-Projekt-Management - Grundlagen und Vorgehensweisen. Springer Fachmedien, Wiesbaden.

MacLeamy, P. (2004) – Collaboration, Integrated Information, and the Project Lifecycle in Building Design and Construction and Operation.

Stoy, C. (2010), Kostenplanung mit dem Baukostenplan Hochbau eBKP-H. CRB-Bulletin. Ed. 2010 3.10, p. 9–10.