IMPLEMENTING TAKT PRODUCTION IN RENOVATION PROJECTS

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AGENDA

• Introduction
• Research design
• Literature review
• Process model
• Implementation
• Discussion & Conclusions
**INTRODUCTION**

- The unique features of renovation projects make production control challenging
- The specific suitability and benefits of takt production in renovation projects have not been studied widely
- A design science study that examines the suitability of takt production in renovation projects
- The findings imply that takt production can benefit renovation projects
RESEARCH DESIGN

Design science research

Research questions:
- Is takt production suitable for renovation projects?
- If yes, what restrictions, preconditions and benefits are associated with the method?

1) Problem statement
   - Find a practical issue or an interesting opportunity to adapt known practices to new contexts

2) Diagnosis
   - Obtain understanding of the problem from a practical and theoretical perspective (literature & interviews)

3) Solution-forming
   - Develop a solution (literature & interviews)

4) Implementation and development
   - Implement the solution and test how it works
   - Develop the solution based on the results

5) Analysis and discussion of the results
   - Analysis of theoretical contribution
   - Analysis of practical contribution

Figure 1. The structure of the research
• Three different takt production methods were studied:
  • Takt Planning and Takt Control (TPTC) (e.g., Binninger et al. 2017)
  • Takt Time Planning (TTP) (e.g., Frandson et al. 2013)
  • Ship Cabin Refurbishment (Heinonen and Seppänen 2016)
• There are various documented cases but not too many from renovation projects
LITERATURE REVIEW – RENOVATION PROJECTS

• Special work tasks, including e.g. demolition, abatement, preservation and conservation require particular professional knowledge
• The current condition and operating systems of an existing asset need to be fully understood and researched
• Future occupants often define the schedule and the sequence of renovation
SOLUTION – PROCESS MODEL

- Macro-norm-micro approach of TPTC supported with collaborative tools
- Macro-level standardization: work tasks split in three separate phases with different takt time and takt area

Figure 2. Three-phase takt production in renovation projects
IMPLEMENTATION – CASE PROJECT

- 20 000 sqm office building (1994)
- Full interior & MEP renovation
- Risks included
  - Unaccomplished design
  - Unexposed structures
  - A short production planning time
  - A customer-defined overall duration
- Implementation in two office floors
- Four ~780 sqm takt areas / floor
- Takt time 5 days

Figure 3. The takt area division of the case project
IMPLEMENTATION – TAKT SCHEDULE

- The preliminary takt plan was planned by the general contractor
- The MEP contractor participated in detailed planning through several comment rounds and LPS meetings
- Other contractors agreed the plan and resources in contract negotiations

Figure 4. The final takt plan of the case project
IMPLEMENTATION – KEY RESULTS

- Only minor adjustments were done after the buffer wagons were updated.
- The main delays were the last 5 percent of the work located around the stair shafts.
- The contractors followed the schedule quite intuitively.
- COVID-19 pandemic put additional challenges on collaboration.
- MEP contractor struggled.

Key results of the interviews:
- Three-phase model was supported.
- The level of participation of the partners was supported.
DISCUSSION & CONCLUSIONS

Takt production can be a suitable method for renovation projects, even if the prerequisites are not fully accomplished.

Phasing of the production was seen as effective in managing deviations that are common in renovation projects.

Future research possibilities: takt production in different kind of renovation projects, focusing also on less repetitive production that includes more renovation specific work phases.
THANK YOU!

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