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Challenges found in handover of commercial buildings

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Abstract

This paper examines the handover process in Norwegian construction industry, focusing on commercial buildings. Improving handover processes reduces the number of conflicts, increases user value, improves indoor climate along with securing overall building performance, both in closing construction phases as well as throughout the building lifetime. As little research is found on the subject, a collective project was initiated by the municipality of Trondheim. This case study is limited to a single, environmentally certified, office building in Norway. The paper aims to determine main delay and defect causes. Finally, some countermeasures are identified. A literature review along with a document study was performed. Seven semi-structured, case specific interviews were conducted in addition to a pilot study consisting of three interviews on the same topic. The case respondents are project managers from contractor and client with extensive experience from the Norwegian construction industry. Several causes in contractor-client interfaces were identified. Among the most critical were late changes and decision-making, lacking understanding of limitations and potential in design-build contracts, conflicting interpretation of specification of work along with complex technical installations. Possible countermeasures are found to be strict decision planning, sufficient time buffers, early reconciliation of client expectations together with sufficiently detailed specification of work and significant specialist knowledge in complex technical coordination. This paper investigates a little scrutinized part of Norwegian construction projects in an effort to better commercial building performance and profitability. Future research on multiple construction projects would help confirm or disprove findings and the identified countermeasures.

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1. Introduction

This paper reports on a study initiated by the municipality of Trondheim, Norway, of the handover process of commercial buildings within the context of the Norwegian construction industry. More specifically, it analyses the causes of office building delays and defects identified in this process along with countermeasures to remediate these.

A construction project is typically characterized by being a one of a kind product, tailor made according to the specifications of a given client. It is generally seen as a unique set of coordinated and controlled activities constrained by time, cost and resources (British Standards Institution, 2000). These are undertaken to achieve specific requirements. Through various forms of contracts a project organization is established, often with conflicting environmental, personal or financial interests. Whyte et al. (2013) have identified the handover stage of construction projects to be particularly challenging. According to Statistics Norway, the start-up of Norwegian office buildings amounted to a total of 600 000 m² in 2014. The municipality of Trondheim has indicated that a complex building and process makes for a larger number of delays and defects than a straightforward building project.

1.1. *The problem – causes and countermeasures*

NS 8430 is the Norwegian standard for handover of buildings and civil engineering works (Norwegian standardisation organisation, 2008b). Handover is, according to the standard, to be conducted through an inspection of contract work and documents. In spite that the standard - apparently - clearly describes the handover process, the municipality of Trondheim has indicated the Norwegian handover process as being too costly and time consuming as well as inefficient due to excessive delays and defects. Likewise, the literature review conducted in the initial phase of this study indicated that the handover process presents a challenge internationally. Koski (2004) describes the Finnish handover process as implemented quite deficiently. Forcada et al. (2013) report on a significant number of defects in the handover of Spanish housing projects, and Josephson and Hammarlund (1999) have found a great number of defects in their study on causes and costs of defects in Swedish construction. Dvir (2005) found - after a study of defence projects - that final user preparations for operational use are highly correlated with customer benefits. Overall, however, little research seems to cover the issue. The ambition of the paper is to study challenges and potential countermeasures in the handover of commercial buildings specifically. We intend to address the following research questions:

1. What are the main causes for delays and defects in the handover process?
2. What countermeasures can be implemented to avoid these delays and defects?

The paper intends to address these by a case study following the principles of Yin (2014) on a Norwegian office building, going through final stages and handover.

2. Methodology

A literature review as well as a document study was carried out in addition to three general semi-structured pilot interviews and seven semi-structured, case specific interviews. The respondent group was composed of respondents from both contractor and client side. The office building is an environmentally certified, 11000 m² building in Oslo, Norway. This design-build (DB) project was chosen for its complexity, its handover date as well as the fact that the main author knew it through two consecutive summer internships and by a previous pilot study.

In accordance with the procedures outlined by Blumberg et al. (2014), a literature review was performed to understand handover processes in Norway from a theoretical point of view. The main sources of literature on the subject were databases available through the Norwegian University of Science and Technology libraries, as well as

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