



29th World Congress International Project Management Association (IPMA) 2015, IPMA WC 2015, 28-30 September – 1 October 2015, Westin Playa Bonita, Panama

Defects at handover in Norwegian construction projects

Iman Shirkavand, Jardar Lohne ,Ola Lædre*

Department of Civil and Transport Engineering, N-7491 TRONDHEIM, Norway

Abstract

This paper reports on a study of the most common buildings defects at the handover, and examines the causes of defects, the consequences for main contractor, subcontractors, users and clients and improvement opportunities. The purpose of the study is to help better planning at handover with less deviation to increase value for client, contractors and users. The case study based research including a literature study and case studies from the respective cases and interviews with key participants from both the clients' and contractors' organization. The results show that the most frequent defects registered at the handover are related damage to surfaces. These are usually due to by human errors, fall of tools, locating of heavy materials, transportation of goods and materials and time limits. These are mostly neither difficult nor expensive to correct. Defects related to the technical installations are the next area that has the most frequent negative deviations. The technical installation should work together to complete the whole system functioning, so problem in one component prevents the whole system to fully functioning. The main reason for defects is incomplete and poor design. Economic losses and undermine confidence between the different stakeholders in the construction industry are the main consequences of defects. More attention to technical installations and less on surface appearance during the handover process, following up standard contracts, detailed and realistic forward planning to avoid time constraints and continues dialogue with client recommended to avoid defects.

© 2016 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Peer-review under responsibility of the organizing committee of IPMA WC 2015.

Keywords: Commissioning; handover; takeover; defect; construction; build and design contracts; project management

* Corresponding author. Tel.: 47 911 89 938 ; fax: +47 73 59 70 21.
E-mail address: ola.laendre@ntnu.no

1. Introduction

Handover is typically considered as the last activity in the construction process before the client takes over a building. Participants in building projects identify handover as a difficult phase in this process. It is the impression of the authors that these challenges increase as construction projects tend to grow more complex, as they seem to do. According to Akin (2011), for instance, many large and expensive new construction projects were planned and designed for energy-efficient buildings with high standards. According to the literature analyzing the operating phase, severe malfunctions in buildings components and function can often be found. 2-6% of net production value is typically used to mend process related damages in construction projects, that is, damages inflicted during the construction process and discovered by the customer or user after the commissioning of the building (Ingvaldsen, 2008). According to Josephson and Hammarlund (1999) 40-55 % of the total defect cost is due to design and 20-45 % due to production in operation phase. Equally, they found that, in the construction phase, 54% of total defect cost results from production and 20% from design. Finding defects as early as possible and thorough testing of the building before the handover consequently seem crucial to reduce costs and ensuing conflicts.

1.1. Purpose

Well-planned handover with less deviation is positive for client, contractor, subcontractors and users alike. In order to realize a better handover it becomes necessary to find deviations and the reasons for them, so that proper measures can be identified. Consequently, this paper addresses the following research questions:

- 1) Which defects do buildings have at the handover?
- 2) What consequences have the defects for the builder, user and contractors?
- 3) What causes the identified defects?
- 4) What improvement opportunities have handover process?

1.2. Delimitation

The research is limited to design-build type contracts, chosen for being the most common form of the contract for the selected projects in the Norwegian public sector. Defects in other form of contracts is not considered in this study, however, according to Schultz et al. (2014) design and build contracts contributes to better results as regards the number of defects.

In addition, the research is limited to focus on buildings with medium level complexity. With medium level means building with technical systems like heating, ventilation, and air conditioning (HVAC). A kindergarten, a school, four nursing homes, and a block apartment is studied. Evaluating small houses without ventilation systems is thus avoided. It is also avoided large and complex buildings where it is difficult to find deviations and the causes due to interacting between many items like hospitals.

The issues were limited to the most common and widespread deviations at handover time. It is also hard to point a clear distinction between causes where there is complex of many factors like electrical related and technical related defects e.g. automatic system. Therefore, most of project managers call both electrical and other technical generally to technical.

2. Theoretical framework

2.1 Post-Occupancy Evaluation (POE) and commissioning

Buildings in general are subject to performance deficiencies in performance and sustainability. As a consequence, it is often necessary to introduce post-occupancy interventions to minimize such defects (Douglas, 2006). Post-Occupancy Evaluation (POE) is an evaluation that takes place after the handover that shows the undiscovered defects. According to Karim and Carl (2009), Post-occupancy evaluation is a process of systematic evaluation of the building's performance over a period of time in operation phase after finishing the construction phase. Green and

Download English Version:

<https://daneshyari.com/en/article/1107463>

Download Persian Version:

<https://daneshyari.com/article/1107463>

[Daneshyari.com](https://daneshyari.com)