

# Construction project change management in Singapore: Status, importance and impact

Bon-Gang Hwang <sup>a,\*</sup>, Lee Kian Low <sup>b</sup>

<sup>a</sup> Dept. of Building, National University of Singapore, 117566, Singapore

<sup>b</sup> Keppel FMO Pte. Ltd., Golden Agri Plaza, 108 Pasir Panjang Road 118535, Singapore

Received 11 July 2011; received in revised form 5 October 2011; accepted 3 November 2011

---

## Abstract

Changes in construction projects are inevitable. In order to minimize the impact of changes on a project, it is imperative to implement change management. This study aims to assess the status, importance and impact of change management implementation in the Singapore construction industry. To achieve the objective, a comprehensive literature review was conducted to gain an in-depth understanding of change management, and a questionnaire survey was conducted. Analyzing the data collected from 384 projects submitted by 32 companies, the implementation status was investigated at both company and project levels, followed by identification of key factors that encourage and discourage companies to practice change management. Furthermore, the importance and impact of change management in terms of project performances such as cost, time, and quality were also examined. The analysis results establish that the implementation status in the Singapore construction industry is relatively low while improvement in project cost, time and quality performances achieved by the companies that implement change management tends to be greater than the companies that do not. Recognizing the implementation status, importance and impacts of change management will be a starting point to reduce changes that negatively affect project performances, ultimately allowing the Singapore construction industry to increase opportunities for project success.

© 2011 Elsevier Ltd. APM and IPMA. All rights reserved.

*Keywords:* Change; Change management; Cost; Schedule; Quality; Performance; Best practice; Construction project; Singapore

---

## 1. Introduction

The construction industry is one of the sectors that provide significant contributions to Singapore's economy and thus, it is imperative to sustain successful deliveries of construction projects in Singapore. While construction projects vary in size, duration and complexity, several common features can be found. One of the most common concerns in construction projects is project changes (Ming et al., 2004). Changes usually occur at any stage of a project due to various causes from different sources, and have considerable impacts (Karim and Adeli, 1999; Motawa et al., 2007). Any additions, deletions or modifications to the scope of the project are considered as changes. According to Park (2002), construction changes refer to work state, processes, or methods that differ from the original

construction plan or specification and usually resulted from difference in work quality and conditions, scope changes, or uncertainties that make construction dynamic and yet unstable. Also, Zhao et al. (2009) emphasized that the complex and dynamic nature of construction projects poses uncertainties and risks.

The earlier the changes are rectified, the lesser impact it will have on the project. Furthermore, conflicts over project changes can be minimized when the problem is found at the earlier phase of the project. Hence, it is very important to implement change management to construction projects and among many project management best practices, change management has become one of the most important practices (Motawa et al., 2007; Zou and Lee, 2008). The efficacy of overall change management practice in different types of projects can vary widely depending on project nature, industrial type, project complexity, project size, contract methods and the level of experience

---

\* Corresponding author.

of project participants. Nevertheless, with appropriate change management, preventive measures can be planned for potential changes, and for changes that have already occurred, it can be resolved in a timely and systematic manner. This will ensure a successful execution and good management of a project, ultimately generating more revenues for the economy.

Under this assertion, this study aims to encourage more practitioners to implement change management into their projects in an attempt to minimize cost and schedule overruns and quality problems. More specifically, the objectives of this study are: (1) to investigate the current implementation status of change management in the Singapore construction industry; (2) to explore benefits and barriers of change management implementation; and finally (3) to analyze the impact of change management on project performances. For this study, perspectives of contractors working mostly in small and mid-sized firms in Singapore were analyzed and changes that occurred in both design and execution phases were considered.

## 2. Background

### 2.1. Definitions of project change

Ibbs et al. (2001) stated that any additions or deletions to project goals or scope are considered to be changes, whether they increase or decrease the project cost, schedule or quality. Similarly, Arain and Low (2005) defined that a change is any modification to the contractual agreement provided by the contractors or owners. When project changes occur, there are bound to be certain consequences. The impact of project changes can either be significant or trivial as it may affect the operation and progress of the project. In addition, Isaac and Navon (2008) claimed that the main causes of changes are such as project delays, cost overruns and quality difference from the agreed requirements. Therefore, impacts of changes should be examined and dealt with in a systematic manner as it may hinder the project performance.

### 2.2. Sources of project change

It is also important to identify different sources of project changes before attempting to minimize it. Project changes can be originated from numerous factors that are related to the construction projects. Both internal and external elements can influence any project changes to occur (Love et al., 2002). Firstly, the internal factors include project, organizational and stakeholder related issues. Project related issues comprise of uncertainties of project, increasing project complexity, inaccurate cost estimating, shortage of resources availability, or change of financial status of any party involved in the project. Next, organizational related issues refer to change in management, lack of timely and effective communication, and lack of integration between departments (Ibbs et al., 2001). Stakeholder related issues are for instance, design errors, omissions, or modifications to the drawings leading to ineffective design, poor project definition by owners, inadequate pre project planning, inadequate project change management, poor communication among owners, designers and

constructors, or constructability ignored in the design process (Hwang et al., 2009).

Secondly, the external factors consist of natural unforeseeable circumstances, government intervention, economy, or legal issues. Due to natural unforeseeable circumstances such as inclement weather, project duration is often delayed as it is unpredictable. During inclement weather especially rainy or stormy seasons, it will not be possible for workers to perform any work at the construction site. As safety is also one of the main concerns in construction industry, the well-being of the workers should not be risked. Government related issues are for example, statutory requirements or strict rules and regulations that must be complied with.

Changes in tax and interest rates are some of the economy related issues. It affects the project in terms of the financial viability. Uncertain inflation rate can affect the cash flow and material availability of the project. As for legal issues, the implementation of new law or regulations may impose project scope to change and incur more project cost.

As a consequence of all these factors that surfaced, it will lead to project changes and eventually having an impact on the project. The degree which project will be affected will be elaborated further.

### 2.3. Effect of project change

Considering that changes can have both positive and negative effect on project cost, schedule and quality, changes can be categorized into two main types, namely beneficial changes and detrimental changes (Ibbs et al., 2001). Beneficial changes can be resulted from exercising value management. Although value management may incur more cost to the project, it is useful and helpful to the project in the long run. Since beneficial changes are of advantage to a project, these changes are encouraged in a project by the management team. In contrast, detrimental changes are discouraged and result in negative impacts to the project, reducing values going to the owner. Ibbs (1997) concluded that because changes are common in projects, it is critical for project management team to confront, embrace, adapt and use variations to impact positively on the situations they face and to recognize changes at the early phase of the construction. Also, in order to contribute to a successful project, it is very important for the timely identification of impacts of project changes. Some of the major negative impacts of changes are as follows:

#### 2.3.1. Increase in project cost

This is the most common effect of project changes which may occur (Arain and Low, 2005; Assaf et al., 1995; CII, 1990; Clough and Sears, 1994). Any major additions to the original work scope will lead to a significant increase in project cost. Therefore, there is always the contingency sum in the contract to counter for this purpose.

#### 2.3.2. Recruiting New Professionals

According to the research conducted by CII (1995) changes are frequent in complex technological projects. Considering

متن کامل مقاله

دریافت فوری ←

**ISI**Articles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات