

# Chapter 36

## Scope Reductions as Tool for Cost Control in Construction Projects: An Ex-Post Analysis of Scope Reduction Options

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### **ABSTRACT**

*Scope management is a key issue in construction projects. This paper studies scope reductions. Potential reductions of project scope as well as budget contingencies have been a tool for cost control of governmental investments in Norway since 2001. This paper studies implementation of such reduction in major construction projects in different governmental sectors. Project representatives were contacted to obtain information about actual use of pre-defined potential scope reductions. Eight of the 14 studied projects did not implement any of the predefined reductions. Six projects implemented some of the reductions. These reductions were mainly general reductions of the quality of the facilities. The Norwegian reduction lists are based on an unusually high degree of specification of potential actions for cost control. International best practice is more concerned with general approaches. To function as intended, possible reductions should be possible to implement late in a project. General contingencies appear to be more effective for cost control than predefined scope reductions.*

### **INTRODUCTION**

Scope management is a key issue in construction projects. The typical approach in scope management is to avoid scope increases. This paper looks at another approach, asking how scope reductions can serve as a tool for cost control. According to Chevroulet et al. (2012), the majority of transport infrastructure projects in the European Union are subject to cost overruns, and an average project is 15–20% over budget, with one in four even above that.

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They also state that the most important reasons for cost overruns are changes in project specifications, the rise of environmental and safety requirements, technological risks, and changes in material costs, in decreasing order. A large number of studies, including Flyvbjerg et al. (2003), Shane et al. (2009) and Doloi (2011) point to cost escalation of major projects. In a comprehensive study of projects in five continents and twenty nations, Flyvbjerg et al. (2003) found that 90% of projects had cost overruns of between 50 to 100%. They claim that overruns had been constant for the last 70 years.

Love et al. (2013) studied cost overruns from 276 construction and engineering projects and found a mean cost overrun of 12%. Berg, Kilde and Rolstadås (2003) discuss some lessons from large Norwegian public infrastructure projects. They reported overruns between 10 and 222%, mainly explained by unclear change processes and insufficient risk management. Cheng (2014) found that clearly defined scope of project in the contract and cost control were major determinants for cost overrun of construction projects. Practitioners and academics in project management strive to avoid and control the overruns.

This paper maps the use of potential scope reductions and contingencies in construction projects. The reduction lists consist of scope reductions that are not desirable, but that can be implemented in large Norwegian governmental investments if there is a risk of cost overrun. Such reductions are a part of a Quality assurance scheme required by Norwegian Ministry of Finance for large government investment initiatives over 750 million NOK (Concept 2015). The bulk of the investments that are subject to the scheme are construction investments in the sectors of public facilities, defense and transport.

The scheme has two formal decision points, Quality assurance 1 (before the decision of the government) and Quality assurance 2 (before the decision of the parliament). As part of the Quality assurance 2, a quality assurer will propose budget contingencies and reductions that can be implemented if the cost is in danger to be exceeded. The scope reductions are summarized in reduction list). The quality assurers are project management consultants. This type of pre-defined possible scope reductions have been applied to large governmental projects since 2000 in Norway. There have been raised questions about how these potential reductions are used during project execution. This paper analyzes the use of such scope reductions for major projects. We want to follow up construction projects that are completed to see to what extent the predefined scope reduction are used.

This paper studies how the reductions have actually been implemented. The reductions lists are an example of value engineering. This study adds to the literature that describes to what extent value engineering proposals are implemented (such as Palmer et al. 1996).

The purpose of the study is to follow up the use of potential reductions for a range of completed construction projects. The research questions in the study are:

- To what extent are predefined scope reduction options implemented in construction products?
- What are characteristics of implemented scope reductions?
- What is the relation between budget contingencies, uncertainty estimates and use of predefined scope reductions?

The paper is structured as follows. Firstly, it gives a short introduction to the Norwegian Quality assurance scheme for governmental investment. Then follows an overview of international experiences with scope reduction lists and similar measures. There is literature that discusses cost control measures that have similarities with the reduction lists, but there are few studies that explicitly address pre-defined potential scope reductions. The research methodology of the study is presented. Finally, we present the results and conclusions.

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