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# Success factors for early contractor involvement (ECI) in public infrastructure projects

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**Abstract**

It is widely accepted that contractor involvement in the front end can influence the outcome of the project in a positive way. However, in the traditional project delivery method of construction projects, the design and construction process are separated and sequentially. As a consequence of this, it is difficult to integrate construction knowledge in the front-end of projects. The evolving project methods are designed to remove such typical challenges by involving contractors early in the process. The purpose of this paper is to explore the success factors for early contractor involvement (ECI) in public infrastructure projects. In addition, the paper aims to propose suitable approaches to implement ECI for public owners in future projects without violating the EU public procurement directives. In addition to a literature study, multiple case studies on eleven projects selected from the Norwegian public bridge projects were carried out. The majorly identified ECI success factors are timing of ECI application, proper compensation, trust, contractors` qualification, owners` competence, and risk distribution. The paper concludes that public owners can implement ECI by using various approaches without violating the EU public procurement directive. Furthermore, based on the identified success factors, effective practical strategies for the successful implementation of ECI may be generated.


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## 1. Introduction

Various strategies can integrate knowledge from construction into design [1]. One of the evolving strategies is early contractor involvement (ECI) [1, 2]. ECI offers improvement in value for money and project delivery time [3]. By applying ECI, an owner can have more control over the project cost as the prices of the bids are made clear earlier in the process [4]. In addition, the client makes sure on the implementation of environmental and social measures that are decided in the planning process. These will benefit not only the client but also other stakeholders and shareholders [4, 5].

According to previous research, ECI seem to be most beneficial when it is introduced in the early phases of the project. These phases of projects are typically characterized by having the largest potential to influence the design and where there is no significant project cost increase inflicted by changes [6]. The construction industry has also positive experiences of practicing it. However, ECI faces many barriers when it is implemented since it is different from the traditional business practices. Some of the common practical barriers areas are found in contracting practice, teamwork, and culture change. Predominantly, public owners face a major challenge if they want to implement ECI, due to the selection method defies established standards. It is a challenge for them to involve the construction team as early as found beneficial within ECI, since public regulations oblige them to use competitive, transparent team selection. Furthermore, they are obliged to make sure to consider both price and quality during the early team selection. That is in order to comply with EU public procurement directives [6]. A better understanding of ECI concept and its benefits for project success will improve its use to reach the full potential [1].

We have not found, however many literatures that discuss the success factors of ECI with an intention of increasing ECI concept understanding. Therefore, this paper set out to identify the success factors of ECI for public owners with an ambition of filling this knowledge gap. Moreover, this paper aims to propose various approaches to implement ECI for public owners on future projects.

The following research questions are addressed in this study.

- What are the success factors for early contractor involvement?
- How can public owners implement early contractor involvement on future projects?

## 2. Research method

The research was carried out based on case study approach. It was stared with literature study, followed by document study of chosen eleven cases and fourteen interviews with key actors from the selected cases.

To answer the research questions, the authors have started the research by studying relevant literature to gather background knowledge about ECI concepts and applications. The objective of the literature review was to identify relevant previous researches and thereafter establish a theoretical framework. The approach was to search for keywords in academic databases through search engines Google scholar and Oria. Oria is a Norwegian University library resource comprising academic journal papers, conference papers, reports, dissertations etc. Furthermore, references of articles were also studied.

Furthermore, the research has continued by multiple case studies. According to Yin (2013), choice of research methods in a large part is dependent on chosen research questions. The more the research questions seek to explain some present circumstances (e.g., how and why some social phenomenon works), the more that case study will be relevant [8]. We seek to explain how public owners can implement ECI and what the success factors for ECI are. Case studies hereby become relevant in our study. The cases or projects selection was conducted by exploring bridge projects that have used or `planning to use` various contract forms and implementation strategies, to facilitate integrating contractors` knowledge in the early phases of the projects. In this phase of the research, 20 key-professionals, that have several years of work experiences in Norwegian Public Roads Authority (NPRA), were contacted to find the appropriate projects to study. In addition, NPRA`s yearly internal projects reports from 2001-2013 were studied. The exploration has directed to the following eleven bridge projects that studied in-depth;