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Procedia - Social and Behavioral Sciences 226 (2016) 260 – 268

Procedia
Social and Behavioral Sciences

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

Selection criteria for delivery methods for infrastructure projects

Ali Hosseini^{a,*}, Ola Lædre^b, Bjørn Andersen^c, Olav Torp^d, Nils Olsson^e, Jardar Lohne^f

^{a,b,c,d,e,f}Norwegian University of Science and Technology (NTNU), 7491 Trondheim, Norway*

Abstract

The project delivery method (PDM) greatly influences the project outcome. Design-Build, Construction Management and Design-Bid-Build represent the three main methods. Each PDM comes up with its own advantages and disadvantages which suit different projects in different circumstances. A general literature review and a case specific document study were carried out. Firstly, this paper identifies general criteria for selecting PDM. Secondly, it comes up with specific criteria for selecting the PDM for a large infrastructure project. Due to the project characteristics, the identified specific selection criteria differ from the general selection criteria. The Norwegian Public Roads Administration (NPRA) plans a coastal highway route (E39) along the western coast of Norway covering a total of 1100 km, substituting seven ferry connections, with an estimated cost of 268 billion Norwegian kroner. This project is used as an exemplary case of a large infrastructure project. The paper contributes to the body of knowledge with a list of selection criteria for PDMs aggregated from literature, and points out that this list should be adapted to case specific characteristics before being used to select a PDM

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

Keywords: Project delivery method, infrastructure, selection criteria, mega project;

1. Introduction

The choice of project delivery method (PDM) greatly influences the project outcome and is one of the most important factors that determines a project's success (Al Khalil, 2002, Chan et al., 2001, Kumaraswamy and Dissanayaka, 2001). A Project delivery method is a system for organizing and financing design, construction, operations and maintenance activities and facilitates the delivery of a good or service (Miller et al., 2000).

PDM's effect on a project's cost, schedule, efficiency and success make it a challenging issue for stakeholders and decision makers (Chan et al., 2001, Al Khalil, 2002, Kumaraswamy and Dissanayaka, 2001). The suitability of the selected PDM can improve the project performance to a great extent (Kumaraswamy and Dissanayaka, 2001, Al Khalil, 2002, Oyetunji and Anderson, 2006, Han-Kuk et al., 2008, Udechukwu et al., 2008). There are a large number of different project delivery systems available in the construction industry which aim to overcome the

*Corresponding author. Tel.: +47 913 09 166; fax: +47 73 59 70 21.
E-mail address: ali.hosseini@ntnu.no

shortcomings of traditional procurement (Alhazmi and McCaffer, 2000), Figure 1 classifies some of most common PDMs based on two characteristics: the source of finance, and integration of delivery. The source of finance represents the degree of financial risk that the owner assumes while undertaking the project, while the integration of delivery is the degree to which the different project elements, such as planning, design, construction, and operation, are separated or combined during the production cycle (Miller et al., 2000).

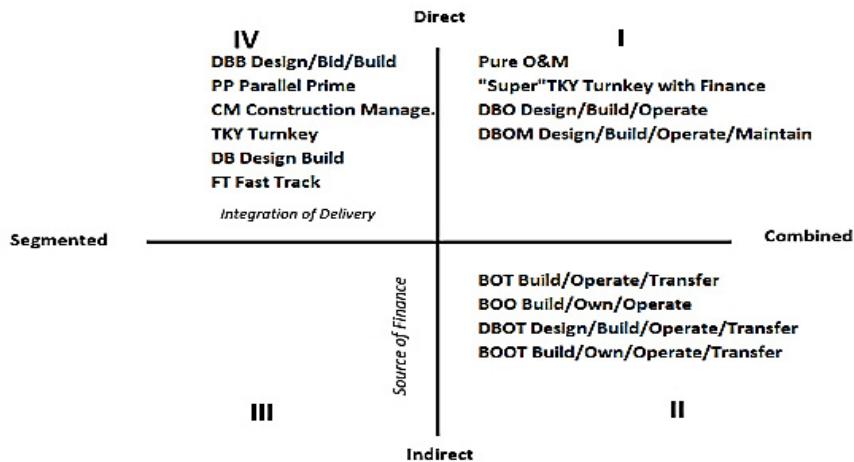


Figure 1 Operational framework for project delivery system (Miller et al., 2000)

In many cases, the PDM is chosen simply on basis of the knowledge and experiences of in-house experts and/or guidance from external consultants (Masterrman and Duff, 1994) without a deep exploration of the strengths and weaknesses of each method, or any regard to the influencing success factors and characteristics of each project.

There are many PDMs listed in literature, but Construction Industry Institute (CII) maintains that all PDMs can be placed into three fundamental PDM categories: Design-Bid-Build (DBB), Design-Build (DB) and Construction Management (CM) (Sanvido and Konchar, 1998). Although discussing the suitability of these models and other procurement arrangements in different circumstances is out of this study's scope, findings can be used to choose a suitable PDM.

With projects becoming more complex and with a large number of project success factors, there is a need to select suitable PDMs with a more systematic approach. Already much research has been done in the area of identifying the criteria that influences PDM selection, however they have focused on proposing a selection method rather than focusing on the criteria themselves. What sets this study apart is that, *firstly, it gathers a comprehensive list of criteria from a literature study and secondly, determines a list of specific criteria to be used for selecting PDM in an infrastructure project.*

2. Method

A general literature review and a document study were carried out. The literature review was conducted according to the guidelines prescribed by Blumberg et al. (2014). The reviewed literature concentrates on PDMs and selection criteria. The tactic was to search for keywords (see Table 1) in databases as ABI/Inform, Science Direct, Scopus, Web of Science and to use search engines as Google Scholar, Compendex and Bibsys ASK.

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