Available online at www.sciencedirect.com

ScienceDirect

Procedia Engineering 77 (2014) 213 – 221

Procedia Engineering

www.elsevier.com/locate/procedia

Fourth International Symposium on Infrastructure Engineering in Developing Countries, IEDC 2013

Factors Influencing Integrated Project Delivery In Publicly Owned Construction Projects: An Information Modelling Perspective

Nida Azhar[a]*,Youngcheol Kang[a], and Irtishad U. Ahmad[a]

[a]*OHL School of Construction, Florida International University, United States*

Abstract

The objective of this paper is to underline the factors influencing the implementation of integrated project delivery (IPD) in public sector construction projects. These factors are broadly classified under legal, organizational and technological categories. Further the role of information modeling to foster the integration in project delivery is discussed. Focus is placed on the aspects/characteristics of information modeling that can contribute to implementation of integrated project delivery. Traditional project delivery methods have been found by researchers as inefficient and litigious. As a result, the construction industry is in a critical need of alternative delivery methods.IPD has emerged as a solution, although its implementation is not without challenges. Therefore factors influencing its implementation should be identified as a step towards its probable use in the future for public-sector construction projects. Owners, particularly the public ones, are apprehensive due to various factors. The purpose of this paper is to investigate these factors and suggest an information modeling approach to overcome the impediments.

Peer-review under responsibility of the Accounting Research Institute, Universiti Teknologi MARA.

Keywords: *Integrated* project *delivery; Building information modelling; Public owners;*

* Corresponding author. Tel.: +1-305-348-3172; fax: +1-305-348-.6255
E-mail address: nazhar@fiu.edu

Selection and peer-review under responsibility of the Department of Urban and Infrastructure Engineering, NED University of Engineering and Technology
doi:10.1016/j.proeng.2014.07.019

1. Introduction

Traditional project delivery methodused in public construction sectors has several limitations [1, 2]. Several alternate delivery systems have been introduced from time to time to overcome these limitations. However thereemphasis was on some specific areas of project deliveryandlacked the overall improvement of project delivery. Integrated Project Delivery (IPD) has emerged in recent years as a method with a potential to revolutionize the project delivery. Unlike other alternatives, it focuses on the overall improvement and integrates processes, tools and people in a system.

Despite its potential, implementation of IPD is in its infancy. Very few projects have been reported to be delivered under this system [3]and most of them done under private sector. Its use in public sector construction is limited due to many reasons. These factors can be broadly classified under legal, organizational and technological issues to IPD implementation. The first objective of this paper is to highlight these factors and the focus of the paper will be on the public sector construction. The second objective is to highlight how advanced ICT tools like building information modeling (BIM) can reduce some of these IPD implementation issues.

The rest of the paper is arranged as follows: in the next section, commonly used project delivery system and their strengths and weakness in terms of performance are discussed. The following section introduces IPD, highlights key characteristics of IPD and compares it with the commonly used project delivery systems. Factor influencing implementation of IPD are highlighted next and are categorized under Legal, organizational and technological factors of influence. Next, role of information modeling with specific example of BIM to aid IPD is discussed. At the end, future research direction has been introduced to develop an information model for public sector to implement IPD.

2. Common project delivery systems

Traditional project delivery system, commonly known as design-bid-build (DBB) method is the most used method for public construction projects [4-6]. Under DBB, public owners are required to award architectural and engineering contracts solely based on qualification to provide the design services before construction phase. The lowest cost contractors then build such projects. Due to this disconnect, this system has several shortcomings that result in frequent claims and disputes between the project participantsand cost and time overruns. In addition to this, technical demands of new and complex building systems, which required more coordination between the project stakeholders, have also created a need for alternate delivery methods. Design- Build (DB) and Construction Manager at Risk (CM-at-Risk) and their derivatives have emerged as alternative delivery methods. These methods have been discussed in the subsequent discussion.

One alternate practice for owners is to hire a Construction Manager (CM) to assist the owners in development of accurate construction cost estimates, scheduling, reviewing the designer’s plans forconstructability, obtaining and negotiating bids, and coordinating the various aspectsof the work [7]. Due to its nature, the role is usually assigned to contractors. The CM may also perform the construction of the project under guaranteed maximum price under an arrangement where the construction manager'srelationship with the owner shifts from that of an advisor, to that of a vendor. This method is called CM-at-Risk. It does create a team approach in project delivery [8]. However, owners faced difficulties due to downsizing the in-house project management teams, costly disputes between the designers and contractors and varied levels of owner experience. These problems created a need of single source design- build contracting [9].

In the Design- Build (DB) system, a single entity provides both services of design and construction and sign a single contract with owner for the performance of both services. This method facilitates team efforts and allows early participation of contractors to provide their input. Gokhale [7]underlined that contractors can participate in the budgeting, programming, financing, review of the design for constructability and cost of construction.However, DB lacks cross check and several designs and construction related problems in the project tend to remain undisclosed.

From the discussion above, we can say that no single alternative methods works best in all project aspects.It can also be observed in Table 1, which gives a comparison of performance of common project delivery systems used in public sector construction.