

A REVIEW ON CONSTRUCTABILITY AND CONSTRUCTION DELIVERY PROJECT METHODS IN ENGINEERING

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ABSTRACT

This paper is a systematic literature review of journal papers and articles on the three project delivery systems (PDS), design-build/bridging (bridging), design-bid-build (DBB) and design build (DB). Mean estimated project cost, project schedule and market share for these three types of PDS were studied and a comparison is shown in this paper. Upon the comparative study, the benefits of bridging over DBB are outlined. The paper finds out that despite the benefits of bridging over DBB, very few projects in the industry have used this system as a choice of project delivery. This is due to lack of information on this project delivery method among the construction industry professionals. Hence, a structured literature review, combined with cost and schedule data comparisons, has highlighted the advantages and disadvantages of the bridging method of project delivery.

Keyword Constructability, Delivery Project Methods.

1. INTRODUCTION

Constructability has been defined by CII (1987) as the optimum use of construction knowledge and experience in the planning, design, procurement and field operations to achieve overall project objectives. It is obvious from the definition that the application of constructability principles during the project life cycle is very important in order to reduce or prevent errors, delays, disputes and cost overruns. To enhance constructability therefore, the most suitable project procurement method should be adopted. In many developed countries, much research effort has been directed at improving constructability through the integrated effort of owners, designers and constructors. Engineering/construction professionals need adequate knowledge and deployment of the right tools to deal with these issues. Constructability or buildability is a project quality improvement technique that if implemented throughout the project delivery process, mitigates these challenges according. Constructability implementation ensures that design professionals consider how a builder will implement the design, which otherwise could lead to scheduling problems, delays, disputes and cost implications during the construction process. Constructability review is one of the established methods for integrating design and construction phase, taking construction knowledge and experience into consideration in the early stages of the project. Improving the productivity and quality of construction projects along with the minimization of cost and the time are significant concerns in construction engineering and management.

These concerns have stimulated specialists to gather the best practices and generate new techniques leading to more productive projects.

2. LITERATURE REVIEW

Karan Chugh et. al. [1] This paper is a systematic literature review of journal papers and articles on the three project delivery systems (PDS), design-build/bridging (bridging), design-bid-build (DBB) and design-build (DB). Mean estimated project cost, project schedule and market share for these three types of PDS were studied and a comparison is shown in this paper. Upon the comparative study, the benefits of bridging over DBB are outlined. The paper finds out that despite the benefits of bridging over DBB, very few projects in the industry have used this system as a choice of project delivery. This is due to lack of information on this project delivery method among the construction industry professionals. Aditya P. Mehendale et. al. [2] Infrastructure projects are complex, capital intensive, having long gestation period and involves multiple risk to the project participants. In many countries shortage of public funds have forced the government to enter into long term contract financing the construction and operation of infrastructure projects. A PPP can be defined to be the private sector construction and operation of infrastructure which would otherwise have been provided by the public sector. PPP structures are typically more complex than traditional public procurement projects. Ivica Zavrski et. al. [3] The literature dealing with general management recognizes two important phases of any project's and product's life cycle, the solution development and solution implementation. Both of the phases have been explored on the case of IT industry and the model recognizes two important variables: number of agents and level of interdisciplinary. This paper will try to determine whether such an approach is also appropriate for the construction industry and will also try to prove whether design and build is an appropriate method of integrating the design (solution development) and construction (solution implementation) phases of a construction project because even though design and build is an integral part of many other manufacturing industries, that is not always the case in construction industry. A. Reza and Sheryl Staub-French. et. al. [4] Building system coordination is a complicated process that requires the detailed layout and configuration of the various building systems such that it complies with design, construction, and operations criteria. Current practice involves an iterative process of sequentially overlaying transparent 2D drawings of each system over a light table to identify potential conflicts and constraints, which is a time-consuming and error-prone process. Recent research efforts have focused on the development of knowledge-based systems to further assist this coordination process. The objectives of this research were to collect and classify data on constructability knowledge utilized as part of a 3D MEP coordination process during design and construction of a complex research facility. We worked with the project team to develop detailed 3D models of all the building systems in several critical spaces. We identified the design and construction knowledge utilized to coordinate these 3D models and classified this knowledge in a multi-variable knowledge framework. The representational framework, 3D modeling process, and modeling constraints are discussed. Bambang Trigunaryah. et. al. [5] Building system coordination is a complicated process that requires the detailed layout and configuration of the various building systems such that it complies with design, construction, and operations criteria. Ali Mostafavi et. al. [6] The selection of an appropriate project delivery system that suits all project and owner needs is one of the key decisions to a successful project. Therefore, this decision should be made based on a thorough analysis. In this paper, a fuzzy multiattribute decision-making (FMADM) model is developed. The model accounts for uncertainties and imprecision in the decision space as well as fuzziness in the nature of the decision attributes. The model utilizes a fuzzy decision-making approach in order to evaluate the membership function corresponding to the utility of each project delivery alternative. Project delivery system alternatives are ranked using fuzzy technique for order preference by similarity to ideal solution method based on their utility membership functions and by evaluating the distance of each project delivery alternative from fuzzy ideal solutions. In the TOPSIS method, alternatives are ranked based on their closeness coefficient (CC). Awad S Hanna et. al. [7] The construction industry is fraught with waste and inefficiencies resulting in projects often failing to meet owners' expectations. Integrated project delivery (IPD) is the newest project delivery system (PDS) and changes the traditional roles and relationships of key project stakeholders. Through increased early collaboration, IPD attempts to eliminate waste and deliver the highest-value projects to owners. It is seen as a potential solution to many of the challenges impeding successful project performance. However, a transformational move toward IPD has yet to reach a tipping point, and its use is not prevalent throughout the construction industry. Little research has been done to quantitatively analyze IPD compared with the more commonly used delivery methods. Francisco Loforte Ribeiro et. al. [8] This paper aims at contributing to clarify the major problems of project delivery of large scale building projects and inputting the lessons learned during the development and construction of the Colombo Centre in Lisbon.

3. CONCLUSION

This study was aimed to compare the cost and schedule performance of design-bid-build and design-build delivery method for building construction projects . Key findings of analysis show that unit cost of design-bid-build project was 22% more than that of design-build projects. Very less significant differences were observed from the results of cost growth between design-bid-build and design- build project delivery method. The results projects had large construction speed, and resulted in better schedule performance. The present study is restricted to univariate analysis; it is recommended that future study be carried out with respect to multivariate analysis.

4. REFERENCES

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