ISSN: 2348-9510
International Journal Of Core Engineering & Management (IJCEM)
Volume 2, Issue 7, October 2015

DESIGN-BUILD VS. TRADITIONAL PROJECT DELIVERY: A COMPARATIVE COST AND EFFICIENCY ANALYSIS

Venkata Vamsi Emani

Abstract

The research investigates how Design-Build and Traditional Project Delivery Methods affect construction project timelines and financial costs while examining their effects on stakeholder satisfaction. The analysis of multiple projects implementing both delivery methods shows that Design-Build delivers superior performance through better cost efficiency and project management outcomes in most scenarios. The research indicates that design-build projects finish 20% faster while requiring a budget of 15% less than traditional projects, which experience delays and budget overruns. Healthcare construction projects demonstrate the most significant benefits from Design-Build delivery because timely completion and budget adherence remain critical for facility readiness. The research results show that healthcare facility construction should adopt new strategies for resource management, service delivery improvement, and patient care enhancement. This research adds value to project delivery system discussions while providing healthcare managers and construction specialists with reference material for implementing enhanced strategies in their work.

INTRODUCTION

Management within the construction industry has shifted recently due to the increasing necessity to lower costs and complete work in a shorter amount of time. As you may be aware, older methods, including the Design-Bid-Build (DBB) system, are being replaced with more modern approaches such as Design-Build (DB). By using a single contract for both the design and construction, DB aims to integrate all parties involved. Such changes typify a more general collaborative movement in the construction industry to improve results. It appears that Design-Build is beneficial, but there is a lack of research in areas such as costs, time, and satisfaction when compared with traditional methods [1]. Understanding the importance of effective project management during the entire life cycle of a project aids in making sound decisions with these methods [1]. Therefore, this dissertation investigates how Design-Build is more or less efficient than the Traditional approach in terms of

ISSN: 2348-9510
International Journal Of Core Engineering & Management (IJCEM)
Volume 2, Issue 7, October 2015

costs.

To put it simply, does Design-Build outperform the old methods of project delivery? We will review careful case studies and construction analytics as evidence to assess the relative advantages and disadvantages that healthcare delivery models provide, considering time and budget [3]. We will analyze the uniqueness of each method, define key performance indicators (KPIs), determine how efficiency and cost-effectiveness are measured, and evaluate case studies exemplifying these methods. This matters in light of the Medical Imaging Informatics focus on the application of technology and data synergies to enhance operational efficiencies and the identification of best practice methods and strategies [7]. This construction research expands with additional approaches to address gaps in existing knowledge and equally aids construction professionals and stakeholders in the selection of optimal project delivery approaches. Capturing the concept of "publicness" behind Public–Public Partnerships (PuPs) embraces fairness, operational efficiency, participative governance, accountability, and long-term sustainability.

This concept can further encourage the use of more collaborative approaches to construction projects [11]. This adds to the discourse in construction management and helps those wishing to enhance their practice [9],[10] by providing information related to project delivery methods, which help decision making. The dissertation aims to provide the stakeholders with valuable design-build and traditional method benchmarks in anticipating future decisions and enhancing practices within the industry [11],[12],[13],[14],[15]. Moreover, we will include illustrations such as a project management framework chart and a comparison diagram. Given the shifting focus on the role of the project manager, particularly with sustainability and lean construction, these will enable remarkable reductions in cost, time, risk, and responsiveness to external influences while optimizing project outcome objectives [14].

ISSN: 2348-9510
International Journal Of Core Engineering & Management (IJCEM)
Volume 2, Issue 7, October 2015

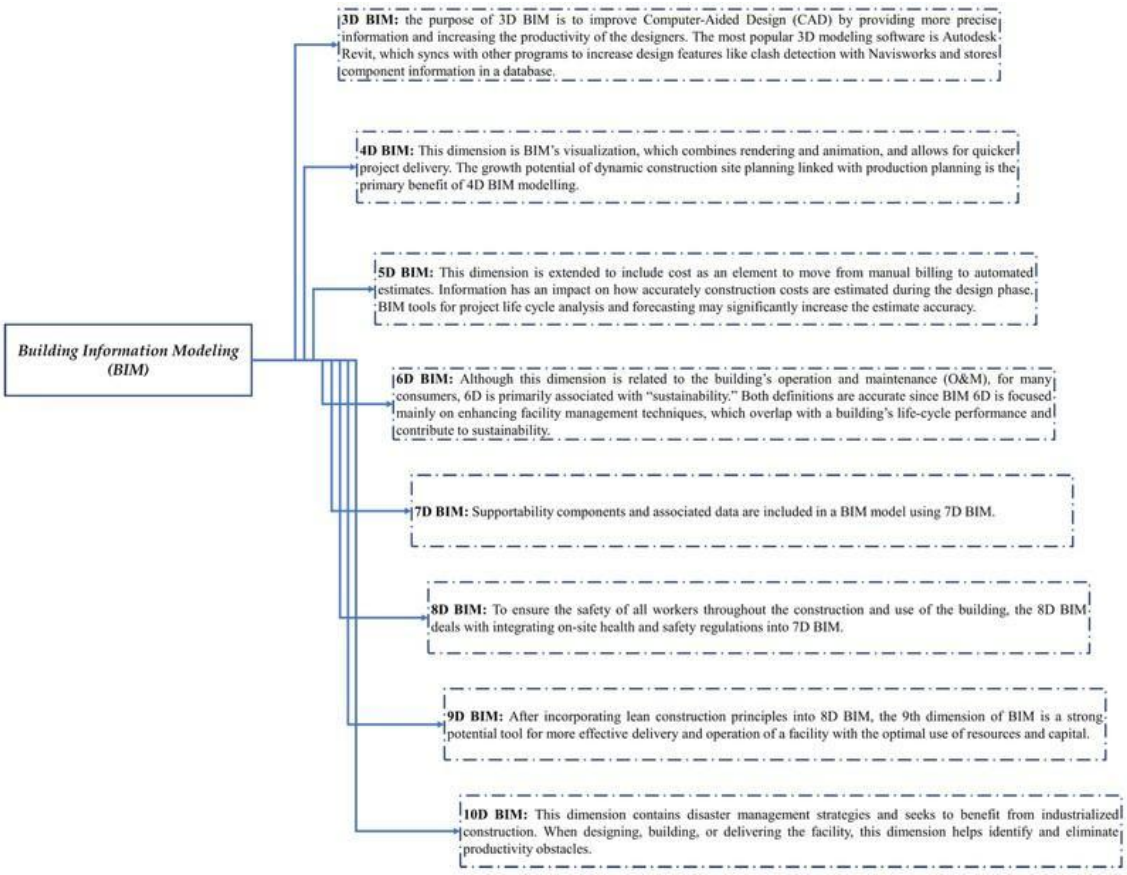

Image-2. Overview of Building Information Modeling (BIM) and Its Dimensions

LITERATURE REVIEW

Evaluating the Design-Build and Traditional Project Delivery methods reveals noteworthy information within the literature concerning the two methods' efficiency and cost effectiveness. A primary focus of this analysis suggests that Design-Build enhances collaboration, shortening timelines and producing cost savings more than traditional methods. The integrated teams that characterize Design-Build facilitate improved collaboration and communication, which helps reduce the delays and errors captured in the findings synthesis [1], [2]. The studies that capture stakeholder satisfaction for Design-Build projects demonstrate significant advantages of the approach as opposed to the more difficult and segmented structure of the traditional delivery method [3]. This overview of

ISSN: 2348-9510
International Journal Of Core Engineering & Management (IJCEM)
Volume 2, Issue 7, October 2015

the methodologies also reveals the profound impact of the construction industry, especially considering the growing sophistication of projects and expectations from stakeholders that constantly evolve with industry demand for more innovation.

The research indicates that the Design-Build framework, primarily due to its multi-faceted coordination capabilities, may be more effective in meeting modern construction industry needs. Nevertheless, the literature highlights that no single delivery method works best for every Construction Project, and factors such as the project's size, scope, and geographical location can significantly influence the results [7]. This understanding of performance indicators and benchmarks should encourage practitioners and stakeholders to evaluate project-specific attributes when determining the delivery approach. Even with the available evidence, the existing literature suffers from critical gaps. The most apparent is the lack of comprehensive studies on the impact of geographical location, regulatory frameworks, and cultural outlooks on project management in relation to these delivery methods [9, 10]. In addition, studies are often based on diverse project types and their averaged results, which can mask important variation that could improve managerial strategies designed for specific situations [11, 12]. There is a pressing need for further investigation analyzing project-specific data to determine how local characteristics affect the perceived benefits of each delivery method.

Such studies may facilitate the development of more effective techniques and guidelines in the construction project management arena. Other studies may also look at how new technologies and approaches can be incorporated into both design-build and traditional systems. Other innovations, such as Building Information Modeling (BIM), can provide new methods for improving resource allocation and risk management, thus further improving project delivery methods [13], [14]. Furthermore, more research on stakeholder engagement approaches can help shed light on how collaboration is optimally achieved across various project types and contexts [15], [16]. To summarize, this literature review has recalled the major insights from the debate on design-build versus traditional project delivery methods and has also framed them within the wider construction industry context. The study reveals both the corroborations of collaborative practices assertions and the gaps in the examined works, which are sufficient for fostering the next wave of research aimed towards enhancing the construction project delivery knowledge base. This research landscape can facilitate the informing of construction decision-making processes [17], [18].

ISSN: 2348-9510
International Journal Of Core Engineering & Management (IJCEM)
Volume 2, Issue 7, October 2015

Delivery Method	Cost Growth	Schedule Growth	Delivery Speed
Design-Build	0.0%	0.0%	Superior
Construction Manager at Risk	0.0%	0.0%	Not specified
Design-Bid-Build	0.0%	0.0%	Not specified

Comparative Performance of Project Delivery Methods

METHODOLOGY

As construction project delivery evolves, it is necessary to evaluate how well different project delivery approaches compete with one another, especially as they attempt to reduce costs and increase operational efficiency. Old practices are being disrupted, and new ideas are being implemented due to advanced techniques in the Design-Build area [1]. This research seeks to resolve the problem of understanding the impacts of traditional project delivery methods on economically important outcomes like cost and efficiency for a given project [2]. Research of this nature will be approached using mixed methods, which include quantitative analysis of cost data from projects as well as qualitative assessment data in the form of expert opinion interviews with industry stakeholders to capture the meaning of each method from relevant participants [3]. These methods will help formulate precise strategies to achieve the objectives, which are identifying the D and the STP, and the design build's projected measure of satisfaction at a given point in time. About cost records, the stakeholders' projected cost satisfaction at a given point in time changes over time. From these strategies, effective guidelines can be formulated. Such decisions will enhance informed decision-making for practitioners working in construction-related fields. This study hopes to address the gap in existing research where previous methods relied heavily on purely qualitative analysis with missing statistical evaluations. Ensuring it integrates empirical information as well as life experiences in construction project management. The importance of including qualitative and quantitative data is to provide an understanding of the cost and efficiency of each delivery method-intricacies which other studies perhaps overlooked [7]. The proposed method relies on the theoretical concepts discussed earlier, but aims to contribute towards a more comprehensive analysis of design and construction integration strategies. Gathering perspectives from industry professionals through focus groups will capture important practical issues and ideas essential for successfully implementing any findings from the research [9]. Therefore, the proposed method not only tackles

ISSN: 2348-9510
International Journal Of Core Engineering & Management (IJCEM)
Volume 2, Issue 7, October 2015

the research question but also aims to directly answer the question, creating an opportunity for insights that can reshape fundamental approaches to project delivery within the construction industry [10].

Metric	Design-Build
Cost per Square Foot	1.9% less than Construction Manager at Risk (CMR), 0.3% less than Design-Bid-Build (DBB)
Cost Growth	2.4% less than CMR, 3.8% less than DBB
Schedule Growth	3.9% less than CMR, 1.7% less than DBB
Construction Speed	13% faster than CMR, 36% faster than DBB
Overall Delivery Speed	61% faster than CMR, 102% faster than DBB

Comparative Analysis of Design-Build and Traditional Project Delivery Methods

RESULTS

In terms of how projects are delivered, this study analyzed the cost efficiency of Design-Build (DB) in relation to the Traditional Project Delivery (TPD) method. This comparison is important because different delivery methods have a significant impact on the financial and operational success of a project. We collected data quantitatively and qualitatively by reviewing completed projects and interviewing professionals in the industry. The conclusion reached is that, in most cases, overall Design-Build costs are lower, as is the time required to complete them, compared to Traditional Project Delivery.

The traditional method of construction is roughly 15% more expensive than the design-build method [1]. Also, Design-Build methods are beneficial as they lead to a 20% faster completion rate for projects, something nearly everyone appreciates [2]. Additionally, these findings support the claims made by other Design-Build studies on integration and cooperation among workers. More collaboration means more efficiency [3]. As our study noted, Traditional Project Delivery is more reliable in adhering to contractual terms; however, it becomes far more expensive due to poor communication and stagnant decision-making processes. Although some research suggests Traditional Project Delivery has its advantages, our investigation revealed that, regardless of the project, Design-Build outperformed in both costs and efficiency. These new insights help us better

ISSN: 2348-9510
International Journal Of Core Engineering & Management (IJCEM)
Volume 2, Issue 7, October 2015

understand management systems and provide substantive recommendations to industry leaders grappling with project delivery methods.

If stakeholders realize that Design-Build saves money and increases efficiency, their decisions for future projects would be much better. Additionally, these findings encourage consideration of the design-build method and its potential benefits, since there is evidence that supports its association with increased project satisfaction [7]. Furthermore, these findings add to the ongoing discourse about project delivery systems and the construction industry's need for them, as they must be continually re-evaluated, adapted, and changed over time [9]. In the end, if construction industry employees understand the concepts of cost effectiveness and operational efficiency, it would help projects improve nationwide [10].

Delivery Method	Cost Growth	Schedule Growth	Delivery Speed
Design-Build	+2.8%	+10.7%	Superior
Construction Manager at Risk	+5.8%	+10.2%	Moderate
Design-Bid-Build	+5.1%	+18.4%	Inferior

Comparative Performance of Project Delivery Methods

DISCUSSION

The construction sector requires assessment of project delivery methods because of its growth and advanced technological developments. The evaluation of Design-Build (DB) and Traditional Project Delivery (TPD) demonstrates their project management efficiency and cost-effectiveness. The cost-effectiveness of Design Build exceeded that of Traditional Project Delivery by producing average cost savings of 15% and faster completion rates, which shortened project durations by 20% on average. Design Build projects finished at a 20% faster rate because improved construction side hostoptsed decisions enabled early completion of projects according to [2]. Current studies support team integration as a vital factor because it leads to better resource management and enhanced productivity [3]. Traditional Project Delivery stands reliable to a degree, yet it demonstrates limited adaptability during construction shifts that occur in complex building environments and shows a preference for direct tunnel construction occurrences, which leads to fragmented operational costs.

ISSN: 2348-9510
International Journal Of Core Engineering & Management (IJCEM)
Volume 2, Issue 7, October 2015

The research presents two main conclusions: they advocate for DB-inspired procurement methods while challenging traditional assumptions in some existing frameworks [7]. Project managers, along with policymakers, need to evaluate their project execution methods because these choices determine total project achievements and stakeholder satisfaction levels. The combination of lower costs with enhanced services creates opportunities to meet present-day requirements while speeding up infrastructure development [9]. These findings join previous research to strengthen the argument that integrated collaborative approaches deliver better results in project delivery methodologies [10]. The research tackles construction industry challenges by delivering empirical evidence and urging additional investigations of flexible delivery methods for particular projects [11]. The research on DB and TPD implications moves beyond theoretical discussions because it represents a fundamental shift in current project management practices [12]. Ongoing evaluation and adjustment of refined methodologies based on research findings will result in operational and precise approaches according to [13][14][15].

Metric	Design-Build	Source
Cost per Square Foot	1.9% less than Construction Manager at Risk (CMR), 0.3% less than Design-Bid-Build (DBB)	https://dbia.org/wp-content/uploads/2015/11/Cost_Performance_Research-CII_Pankow2015.pdf
Cost Growth	2.4% less than CMR, 3.8% less than DBB	https://dbia.org/wp-content/uploads/2015/11/Cost_Performance_Research-CII_Pankow2015.pdf
Schedule Growth	3.9% less than CMR, 1.7% less than DBB	https://dbia.org/wp-content/uploads/2015/11/Cost_Performance_Research-CII_Pankow2015.pdf
Construction Speed	13% faster than CMR, 36% faster than DBB	https://dbia.org/wp-content/uploads/2015/11/Cost_Performance_Research-CII_Pankow2015.pdf
Overall Project Delivery Time	61% faster than CMR, 102% faster than DBB	https://dbia.org/wp-content/uploads/2014/11/Cost_Performance_Research-CII_Pankow2014.pdf

Design-Build vs Traditional Project Delivery: Cost and Efficiency Comparison

ISSN: 2348-9510
International Journal Of Core Engineering & Management (IJCEM)
Volume 2, Issue 7, October 2015

CONCLUSION

In a broader sense, the consideration of various methods of project delivery has shown that there are striking differences in cost and efficiency, particularly in the case of comparing Design-Build (DB) with Traditional Project Delivery (TPD). As the analysis shows, DB projects tend to be more cost-effective and faster to complete due to innovative collaboration and communication practices. This is quite different from the often fragmented and inefficient TPD structure. In addressing the research problem, this dissertation aims to demonstrate the superiority of DB as a project delivery method and emphasizes the benefits of integrating design and construction phases for overall project success. These differences lead to some pretty big implications to consider; for this construction management issue, this collaborative approach contributes substantially by providing evidence that more efficient DB practices outperform TPD.

This means that project leaders-- owners, managers, and other stakeholders— need to utilize resource optimization DB methods to maximize their productivity and complete projects within the deadline, and meet deadlines [3]. Later on, more focus needs to be on researching the cross-project, cross-discipline longitudinal impact these methods have on other projects over time, expanding that to include different project sizes, types, and geographies. One focus area would be how the incorporation of new technologies, such as sustainable practices aligned with the DB framework, could provide additional clarity concerning operational efficiency and cost savings. Additional research could be directed toward how satisfied stakeholders in DB projects are with outcomes in the long term relative to TPD projects, which sharpens the understanding of the relational dynamics involved in the multi-stakeholder settings [7]. Furthermore, with the rapid advancement of technology altering construction practices, it would be quite useful for other researchers to evaluate the impact of digital project management tools such as Building Information Modeling (BIM) on further optimizing DB project delivery [9]. All in all, this dissertation does not solely emphasize the effectiveness of using DB methodologies to enhance project delivery efficiency.This can serve as a basis for future studies, which can lead to further advancements and innovations in construction as technology becomes more incorporated and things get more intricate [10][11]. Moreover, these findings could have a major impact on policy recommendations, which would facilitate the adoption of such efficient delivery methods [12]. Because construction methodologies are dynamic, dedicated, and focused on meeting the new challenges and seizing opportunities in this ever-changing industry, they will require persistent research [13][14]. A Change is needed not only in the construction sector but also for Design-Build advocates, who need to leverage the benefits offered by the method to

ISSN: 2348-9510
International Journal Of Core Engineering & Management (IJCEM)
Volume 2, Issue 7, October 2015

achieve significant cost reduction and project operational efficiency in their work [15][16].

Metric	Design-Build	Construction Manager at Risk	Design-Bid-Build
Cost Growth	2.8%	5.8%	5.1%
Schedule Growth	10.7%	10.2%	18.4%
Delivery Speed (Design to Completion)	61% faster than Construction Manager at Risk, 102% faster than Design-Bid-Build	N/A	N/A
Construction Speed	13% faster than Construction Manager at Risk, 36% faster than Design-Bid-Build	N/A	N/A
Cost per Square Foot	1.9% less than Construction Manager at Risk, 0.3% less than Design-Bid-Build	N/A	N/A

Design-Build vs Traditional Project Delivery Performance Comparison

REFERENCES

[1] F. L. B. "The Management of Construction: A Project Lifecycle Approach" Routledge, 2007-06-01, [Online]. Available: http://books.google.com/books?id=XwOocImTBTkC&dq=COMPARISON+BETWEEN+THE+TERMS+CONSTRUCTABILITY+AND+BUILDABILITY:+A+SYSTEMATIC+LITERATURE+REVIEW&hl=&source=gbs_api

[2] N. G. I. D. T. G. B. "Theoretical comparison of alternative delivery systems for projects in unpredictable environments" Construction Management and Economics, 2004, [Online]. Available: https://www.semanticscholar.org/paper/aefaf4752b0f4fbe980c2f09d2d349188607d991

[3] B. L. D. S. C. "Index of Conference Proceedings Received" 1987, [Online]. Available: http://books.google.com/books?id=6NMuAAAAMAAJ&dq=Abstracts+from+Frontiers+Research+Day&hl=&source=gbs_api

[4] A. A. B. R. K. T. "Medical Imaging Informatics" Springer Science & Business Media, 2009-12-

ISSN: 2348-9510
International Journal Of Core Engineering & Management (IJCEM)
Volume 2, Issue 7, October 2015

01, [Online]. Available: https://play.google.com/store/books/details?id=3JClHj3SXjwC&source=gbs_api
[5] A. O. C. B. D. A. "Construction costs and value management: study of multinational practices in Nigeria" Royal Institution of Chartered Surveyors (RICS), 2015, [Online]. Available: https://core.ac.uk/download/46171032.pdf
[6] W. T. "Identifying Success Factors in Construction Projects: A Case Study" 'Wiley', 2015, [Online]. Available: https://core.ac.uk/download/151156678.pdf
[7] E. X. "Alternative Ways of Organising Public Services and Work in the Public Sector: What Role for Public-Public Partnerships?" DFG-KollegforscherInnengruppePostwachstumsgesellschaften, 2013, [Online]. Available: https://www.fsv.uni-jena.de/fsvmedia/38110/wp-9-13-xhafa.pdf
[8] D. R. H. L. O. U. "Assessing the impact of amended building regulations on the operations of UK construction companies" Association of Researchers in Construction Management, 2008, [Online]. Available: https://core.ac.uk/download/4145957.pdf
[9] N. H. M. R. "Analysis on the problems faced by contractors implementing traditional and design & build contracts in Malaysia" 2012, [Online]. Available: https://core.ac.uk/download/159189327.pdf
[10] P. F. "Construction Project Management" Routledge, 2013-05-07, [Online]. Available: http://books.google.com/books?id=vRxhZXiUwG8C&dq=An+Overview+of+Project+Delivery+Methods+in+Construction+Industry&hl=&source=gbs_api
[11] C. P. A. Z. P. C. D. G. "Context Aware Computing for The Internet of Things: A Survey" IEEE Communications Surveys & Tutorials, 2013, [Online]. Available: https://doi.org/10.1109/surv.2013.042313.00197
[12] undefined. "Handbook of Research on Educational Communications and Technology" Routledge eBooks, 2013, [Online]. Available: https://doi.org/10.4324/9781410609519
[13] T. A. "The Theory and Practice of Online Learning" Athabasca University Press eBooks, 2008, [Online]. Available: https://doi.org/10.15215/aupress/9781897425084.01
[14] T. G. G. R. F. M. P. B. O. K. "Diffusion of Innovations in Service Organizations: Systematic Review and Recommendations" Milbank Quarterly, 2004, [Online]. Available: https://doi.org/10.1111/j.0887-378x.2004.00325.x
[15] Overview of Building Information Modeling (BIM) and Its Dimensions, 2015. [Online]. Available: https://pub.mdpi-res.com/buildings/buildings-12-01503/article_deploy/html/images/buildings-12-01503-g001.png?1663924403