

Financial Impact of Design-Build and Design-Bid-Build on Initial Design and Construction Costs in Multi-Storey Buildings

Shrijith.R¹, Fathima Taskeen Z²

¹Student, Faculty of Architecture, Dr. M.G.R. Educational and Research Institute. Chennai, India

²Asst H.O.D, Faculty of Architecture, Dr. M.G.R. Educational and Research Institute. Chennai, India

Abstract - This study critically evaluates the financial implications of Design-Build (DB) and Design-Bid-Build (DBB) delivery methods on the initial design and construction costs of multi-storey buildings. It evaluates key components such as design fees, procurement, labor, and contingencies using two live case studies from Chennai, the study aims to assess how integration and sequencing in project delivery influence cost efficiency. To facilitate comparison, Cost performance Indicators like Construction Cost Overrun (CCO) and Cost Performance Index (CPI) are utilized to capture deviations and measure financial efficiency during execution. Additionally, the study will propose recommendations aimed at optimizing project delivery methods to achieve better financial outcomes.

Key Words: Design-Build, Design-Bid-Build, Project Delivery, Initial Cost, CPI, Cost Overrun, Procurement, Risk Allocation

1. INTRODUCTION

In today's construction industry, selecting the right project delivery method is crucial in shaping both the financial structure and execution efficiency of a project. Among the widely adopted approaches, Design-Build (DB) and Design-Bid-Build (DBB) offer contrasting frameworks that significantly impact cost control, coordination, and risk allocation. DB offers a unified contract that merges design and construction responsibilities, facilitating faster execution and integrated collaboration. Meanwhile, DBB maintains separate contracts, providing greater design freedom but often resulting in communication gaps and project delays. These fundamental differences influence not only the coordination of work but also the financial trajectory and risk management throughout the project lifecycle.

In many multi-storey building projects, particularly in growing urban centres, stakeholders encounter challenges such as cost overruns, delays, and fragmented responsibilities. These challenges often arise from the way tasks are sequenced and contracts are structured under the chosen delivery model. Understanding how these frameworks affect initial costs—including design fees, procurement timing, labor efficiency, and contingency

allowances—is essential for optimizing financial outcomes. To investigate this, a structured approach is followed that compares the cost behaviour and performance indicators under DB and DBB methods. This enables clearer insights into their financial implications and helps inform better decision-making for future project planning.

1.1 Problem Identification

In urban construction, the choice of delivery method significantly impacts a project's initial costs. Cost escalations often stem from inefficiencies in task distribution and sequencing rather than material or labor fluctuations. Design-Bid-Build (DBB) projects, with separate entities managing design and construction, frequently face delays and coordination issues. Design-Build (DB) integrates both aspects under one contract, offering efficiency but potentially reducing design control. The construction sector struggles with aligning timelines and costs due to inconsistent implementation of these methods. Despite widespread use, lack of contextual analysis hinders stakeholders' ability to predict cost effectiveness. This study addresses this gap by examining how DB and DBB influence early financial stages of multi-storey construction projects. By exploring their structural and cost-related behaviors, the research aims to identify which approach better supports financial efficiency, providing valuable insights and recommendations to optimize project delivery and cost management in the construction industry.

2. METHODOLOGY

This research adopts a comparative case study approach to analyze the cost performance of Design-Build (DB) and Design-Bid-Build (DBB) methods in live residential projects.

Case Study Analysis:

The three real project case scenarios were selected and compared to understand the results for different delivery methods in terms of cost performance, deviations from initial estimates, and overall financial efficiency in multi-storey construction projects :

- Case Study 1: “WTC, Chennai (DBB)” is a 1.8 million sq. ft. development executed using the DBB method. It faced longer design and procurement phases, with higher contingencies due to independent contracting and phased execution.

- Case Study 2: “Doshi Risington, Chennai (DB)” is a 759,640 sq. ft. residential project utilized the DB method. It benefited from early contractor involvement, streamlined procurement, and faster design-construction integration.

Comparison Strategy:

Both case studies are analysed based on critical cost metrics including design fees, procurement costs, labor costs, contingencies, Construction Cost Overrun (CCO), and Cost Performance Index (CPI). Timeline, coordination, and risk-sharing aspects are also reviewed. Quantitative data from both projects is tabulated for direct comparison. The goal is to interpret how integration versus fragmentation in project delivery impacts financial performance and efficiency.

3.RESULTS AND DISCUSSIONS

3.1 Project 1: WTC, Chennai (Design-Bid-Build)

The World Trade Centre in OMR, Chennai adopted the DBB delivery method. With a built-up area of approximately 1.8 million sq. ft., the project was executed under separate design and construction contracts. The design phase spanned 12 to 18 months, while the construction phase extended over 30 to 36 months, totalling 42 to 54 months.

The separation of contracts led to coordination challenges, procurement delays, and excessive change orders. Design changes during execution caused scope creep and contract modifications. Procurement was carried out in staggered packages, resulting in price fluctuations and inconsistent delivery timelines. Labor costs increased due to rework and underutilization during phase transitions.

A key financial indicator, the Construction Cost Overrun (CCO), was recorded at 15.33%, while the Cost Performance Index (CPI) was low at 0.64. These figures reflect inefficient cost control. The absence of BIM and digital tracking tools further impeded timely coordination, and the client bore substantial design and execution risks. Although DBB provided initial control over design, it ultimately led to extended timelines and budget escalation.

3.2 Project 2: Doshi Risington, Chennai (Design - Build)

Doshi Risington adopted the Design-Build approach for a 759,640 sq. ft. project in Karapakkam. From inception, the contractor and design teams worked together under a single entity, enhancing alignment and accountability. The design phase was completed in 6 to 10 months, with the construction phase lasting 24 to 30 months, resulting in a total duration of 30 to 39 months.

This integrated setup enabled early procurement and risk planning, reducing material cost fluctuations and change orders. Labor efficiency improved through optimized scheduling, and the use of BIM tools streamlined coordination. Cost indicators confirmed financial efficiency, with the CCO limited to 8.85% and CPI reaching 0.78, signifying better budget adherence.

Design flexibility was somewhat constrained due to integrated control, but the financial and execution benefits outweighed this limitation. Bulk procurement, shorter timelines, and fewer legal disputes made DB a cost-effective and timely delivery model in this context.

3.3 Live Comparative Analysis

This analysis provides valuable insights into how these two delivery methods perform in practice, focusing on key financial and timeline metrics. The following table showcases various parameters including initial costs, actual costs, planned costs, specific cost breakdowns, construction cost overruns, cost performance indices, and project timelines. By examining these factors side by side, we can gain a comprehensive understanding of how DBB and DB methods impact project outcomes, particularly in terms of cost efficiency and time management.

This comparison will serve as a foundation for our subsequent analysis and recommendations, offering tangible evidence of the strengths and weaknesses of each approach in real-world scenarios.

Table -1: Cost Factors aligned with delivery methods

Parameter	WTC, Chennai (DBB)	Doshi, Chennai (DB)
Total Initial Cost (Cr)	139	113
Actual Cost (Cr)	158	123
Planned Cost (Cr)	137	113
Design Fees	15	10
Procurement Costs	50	45
Labor Costs	60	50

Contingencies	14	8
Construction Cost Overrun (CCO)	15.33%	8.85%
Cost Performance Index (CPI)	0.64	0.78
Timeline (Months)	42-54	30-39

The DBB project had a higher initial cost, extended duration, and greater cost overruns, while the DB model achieved better CPI and CCO due to integrated design-execution and bulk procurement advantages.

Table -2: Budget Adherence & Risk analysis

Parameter	WTC, Chennai (DBB)	Doshi, Chennai (DB)
Cost Index (CI)	1.17 (Over Budget)	1.04 (Near Budget)
Cost Growth Factor	12-15%	5-10%
Material Cost Fluctuation	<ul style="list-style-type: none"> 5.76% Increase High Impact 	<ul style="list-style-type: none"> 4.42% Increase Moderate Impact
Labor Rate Changes	7.19% Increase	6.19% Increase
Contract Variation	<ul style="list-style-type: none"> 8.63% Increase High Risk 	<ul style="list-style-type: none"> 5.31% Increase Little Risk

The DB delivery method outcores in this aspect by fulfilling its potential in better cost predictability, lesser cost increase, allowing for early bulk purchase through procurement aspect, thereby minimizing delays and controlling labour costs. Whereas DB leading to several high-risk factors.

4. CONCLUSION

This study clearly establishes that Design-Build (DB) delivery method offers superior financial control and execution efficiency compared to Design-Bid-Build (DBB) for multi-storey residential buildings. DB's integrated structure allows early contractor engagement, faster procurement, and reduced change orders, resulting in lower Construction Cost Overruns and improved Cost Performance Indices.

While DBB provides detailed design freedom and initial cost transparency, it often results in fragmented responsibilities and execution inefficiencies. DBB's phased approach prolongs timelines and increases financial risks, as seen in the WTC case. In contrast, Doshi Risington demonstrated that DB's consolidated framework

promotes accountability, risk-sharing, and cost predictability.

For future projects, a hybrid approach combining DB's efficiency with DBB's design precision could serve as an effective solution. Stakeholders must evaluate project complexity, budget sensitivity, and delivery priorities to choose the optimal strategy. Aligning delivery method with these objectives can significantly enhance financial outcomes and project success in the Indian construction industry.

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