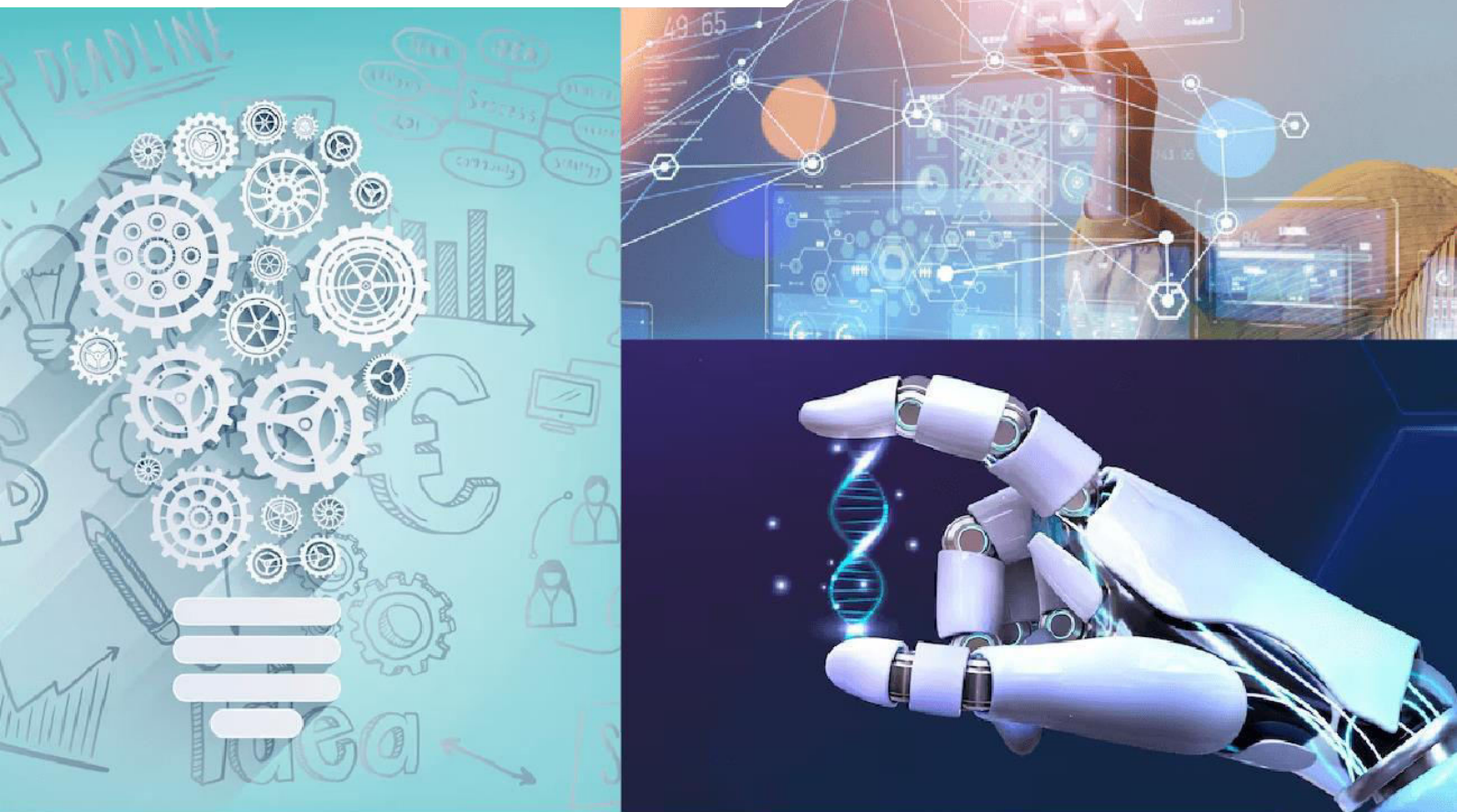




International Journal of Advanced Research in Education and Technology (IJARETY)

Volume 12, Issue 2, March-April 2025

Impact Factor: 8.152



Performance Comparison of Construction Project Delivery System

Miss. Divya G. Ingale¹, Prof. Hemant Dahake²

Student M. Tech, Dept. of Civil Engineering, G. H. Rasoni University, Amaravati, India¹

Assistant Professor, Dept. of Civil Engineering, G. H. Rasoni University, Amaravati, India²

ABSTRACT: Projects can be delivered through several accepted project delivery systems, some of which have evolved over the last few decades. Success or failure of any project is greatly influenced by the performance of cost, time and quality aspects of a project. As these systems have evolved, construction researchers have attempted to better understand the benefits of these systems. Design-Bid-Build (DBB), Design-Build (DB), CM-at-Risk (CMAR) are the three principal project delivery systems in the construction Industry excluding their hybrids, operational and financing modes. To improve the performance of DBB, DB and CMAR project delivery systems, an Agency Construction Management (Agency CM) is added to each of them. The Design-Bid-Build (DBB) system is the most frequently used delivery method for construction projects. The study included literature review, designing a questionnaire, collecting data from 4 projects of Amaravati city.

KEYWORDS: Design-Bid-Build, Design-Build, CM-at-Risk, Agency Construction Management.

I. INTRODUCTION

The global construction industry is expected to reach an estimated value of \$10.5 trillion by 2023. The major drivers of the construction industry are government spending, increasing population, high per capita income, and GDP growth. The future of the global construction industry looks good with opportunities in residential, non-residential, and infrastructure (Research and Markets, 2018). Increasing urbanization, easy credit availability, and rising consumer spending will also possibly boost the construction industry. Strong economic growth in developing nations, such as China, India, and the Middle East countries, is expected to further drive this industry.

Globally, Construction projects are suffering from cost overruns, time overruns and poor quality. The construction industry describes a successful building project as one that is completed on time, within budget constraints, and meets a certain quality standard.

Projects can be delivered through several accepted project delivery systems, some of which have evolved over the last few decades. Success or failure of any project is greatly influenced by the performance of cost, time and quality aspects of a project. As these systems have evolved, construction researchers have attempted to better understand the benefits of these systems. Research has varied from project specific cases, through opinion surveys, to empirical studies.

A. Agency Construction Management

Design-Bid-Build (DBB), Design-Build (DB), CM-at-Risk (CMAR) are the three principal project delivery systems in the construction Industry excluding their hybrids, operational and financing modes. Each of them has some disadvantages. These disadvantages affect the three major performance components of the project namely Cost, Time and Quality. It is reported that across the Construction Industry, including Architects, Engineers, Contractors and Owners, there appears to be a lack of consistency of opinion regarding the advantages and disadvantages of each method.

Agency Construction Management utilizes management techniques during the planning, design, construction and post construction phases of a project for the purpose of controlling the project cost, project schedule and project quality.

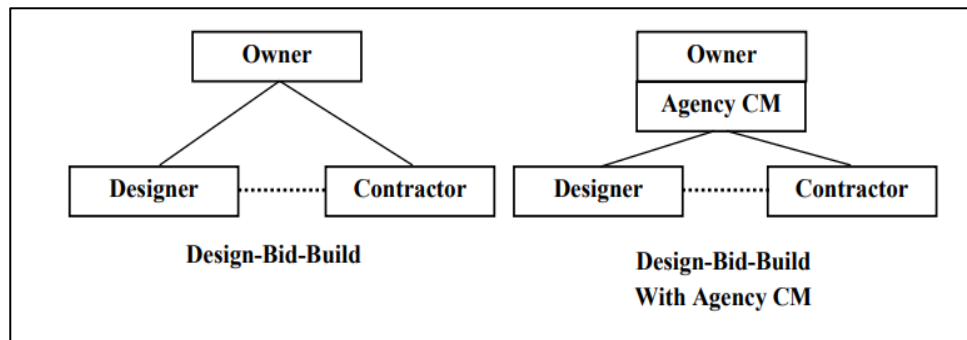


Fig 1 with and Without Agency CM

II. METHODOLOGY

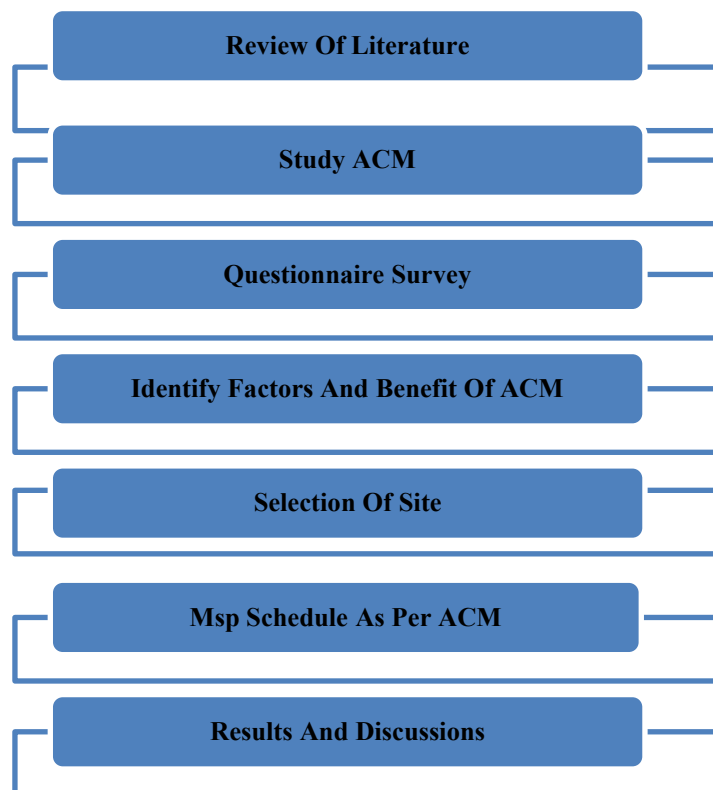


Fig 2 Methodology

III. SITE SELECTIONS

A. Site 1- Heda Sky Tower

Heda Sky Tower is a residential project in Paranjpe Colony, Amravati. It is set in an area of 0.44 Acres. Heda Sky Tower offers Apartment.

B. Site 2- Daga Plazzo

Daga Plazzo is a commercial complex project Opp. D- Mart Mall, Camp, Amravati, It is set in an area of 0.44 Acres.

C. Site 3- Dreamz signature

Available configurations include 2 BHK formats in Shyam Nagar. It is a Under Construction project by Dreamz

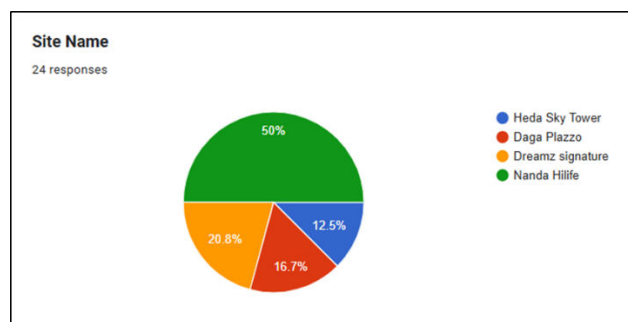
Infraspace. Dreamz Dreamz Signature is set in an area of 0.88 Acres and is complete with various modern-day amenities.

D. Site 4- Nanda Hilife

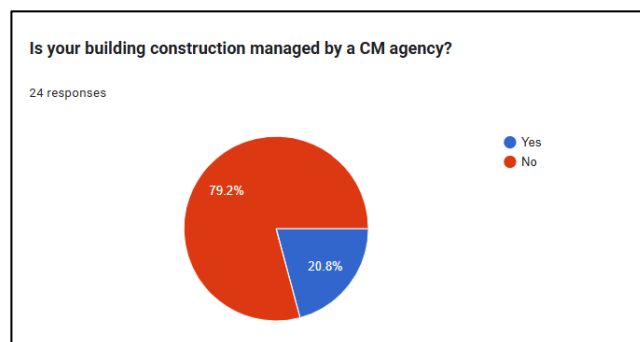
This project by Nanda Properties ensures an open lifestyle to its residents. The apartments, covering a total area of 0.45 acres, consists of 3,4,5 and 6 BHK apartments ranging from 1,164 to 2,747 sq. Ft Carpet Area.

IV. QUESTIONNAIRE SURVEY

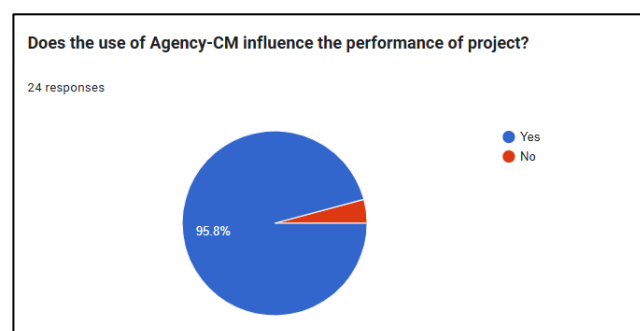
Agency Construction Management questionnaire have been prepared by authors for Employee of the construction sites of Amaravati City for high-rise buildings. The study describes the analysis of research data collected during interviews with engineers/ Employee of the sites.



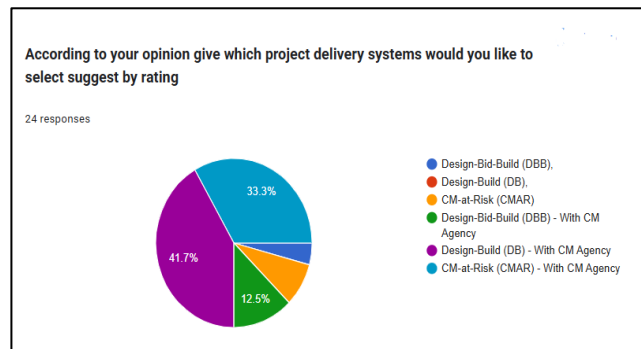
Above graph shows the result for responses collected from four different sites of the Amravati it shows 50 % for Nanda Hilife, 20.8% for Dreamz signature, 16.7% for Daga Plazzo, and 12.5% for Heda Sky Tower.



Above graph shows the result for responses collected for current construction managed by a CM agency and 79.2% are replied with No.



Above graph shows the result for responses collected for ACM influence the performance of project, and 95% of responses says yes for that.



Above graph shows the result for responses collected for opinion for project delivery systems, response suggest the Design-Build (DB) with 41.7%, and CM-at-Risk (CMAR) with 33.3% with ACM both.

V. ANALYSIS IN MSP

Microsoft Project is really a computer database that uses two main tables of data to keep track of your project. Project uses one table to store information about the tasks of your project and the other for resource information.

A. Site For Msp - Site 2- Daga Plazzo

Daga Plazzo is a commercial complex project Opp. D- Mart Mall, Camp, Amravati, It is set in an area of 0.44 Acres

- Cost of project: 2.4 cr.
- Total Duration of completion – 1.5 years



Fig 3 Site 2- Daga Plazzo

B. Scheduling In MSP

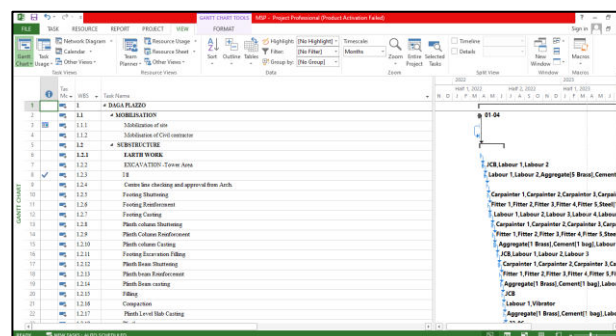
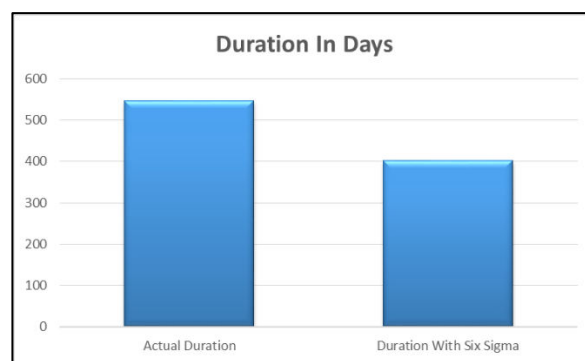


Fig 4 Insert Task

Table 1 Duration In Days

	Actual Duration	Duration With ACM
Duration In Days	547	402



Above graph shows the after applying the ACM to the project we can reduce duration of the project by 140 days ie almost 4-5 months.

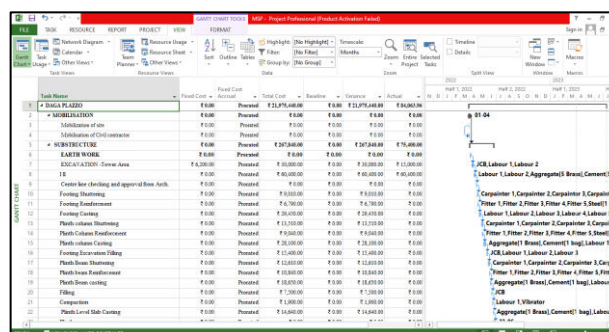
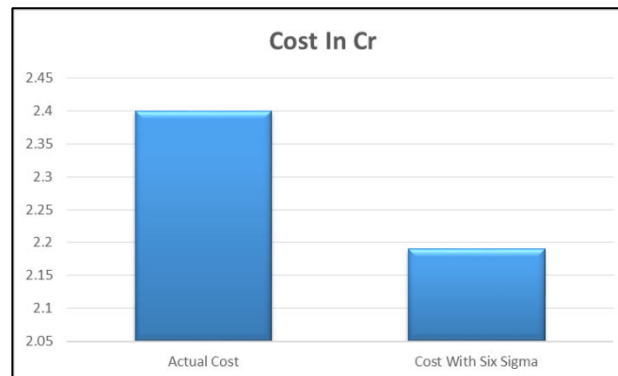


Table 2 Cost In Cr

	Actual Cost	Cost With ACM
Cost In Cr	2.4	2.19



Graph 2 Cost In Cr

Above graph shows the after applying the ACM to the project we can reduce cost of the project by almost 21L, and also reduce cost ie labor cost of the project for 140 days.

VI. CONCLUSION

The selection of an appropriate project delivery method can lead to the success of construction project. However, deciding which one is difficult as each of the primary delivery method has its own disadvantages that somehow can be the reason that contributes to the project failure. None of these primary project delivery methods can be considered as ideal and appropriate to be used to any kind of construction project, as every project is being the only one of its kind. Therefore, the development of new ideal project delivery methods is a necessity to resolve the weaknesses of the existing project delivery method in all aspects towards achieving successful construction project. For that reason Agency Construction Management questionnaire have been prepared by authors for Employee of the construction sites of Amaravati City for high-rise buildings and select appropriate method for Amaravati City.

- Result for responses collected for opinion for project delivery systems, response suggest the Design-Build (DB) with 41.7%, and CM-at-Risk (CMAR) with 33.3% with ACM both can be prefer for the Amaravati City for high-rise buildings.
- In our research study after applying the ACM to the project we can reduce duration of the project by 140 days ie almost 4-5 months and reduce cost of the project by almost 21L, and also reduce cost ie labor cost of the project for 140 days

REFERENCES

1. Abdul Khader Jeelani Shaik, "Empirical Evaluation of Performance of Construction Management at-Risk (CM at-Risk) Project Delivery System With and Without Agency-CM" Technology & Management (2015)
2. Mohammed I Al Khalil "Selecting the appropriate project delivery method using AHP" International Journal of Project Management Volume 20, Issue 6, August (2002)
3. Fouad M. Al-Sinan, "Facility Project Delivery Selection Model" Journal of Management in Engineering (1988)
4. Ibbs, William et. al. "Alternative methods for choosing an appropriate project delivery system (PDS)" Scholarly Journal (2011)
5. Shaik Abdul Khader Jeelani et. al. "Performance Evaluation of Design-Build (D-B) Projects With And Without Agency Construction Management" International Journal of Civil Engineering and Technology (2012)
6. Edward Oladigbolu et. al. "Effectiveness of the Project Delivery Methods in Construction Management. Lagos State, Nigeria" International Journal of Innovative Science and Research Technology (2022)
7. Davidson Rajan Philip et. al. "A Study on Construction Management with Focus on Public Construction and Maintenance Management" International Journal of Engineering Research & Technology (2018)
8. S. Z. Syed Zuber et. al. "An Overview of Project Delivery Methods in Construction Industry" International Journal of Supply Chain Management (2018)
9. Qingping Zhong et. al. "A Framework for Selecting Construction Project Delivery Method Using Design Structure Matrix" MDPI Buildings (2022)
10. Ji-Wei Zhu et. al. "Decision Simulation of Construction Project Delivery System under the Sustainable Construction Project Management" MDPI Sustainability (2020).

International Journal of Advanced Research in Education and Technology

ISSN: 2394-2975

Impact Factor: 8.152