

Contemplation of BIM in Indian Construction Firms

Deshbhushan Patil¹, Nilesh Lunawat², John Pakiaraj³

¹M Tech Construction Technology and Management, Vellore Institute of Technology, Vellore, Tamil Nadu, India

²M Tech Construction Technology and Management, Vellore Institute of Technology, Vellore, Tamil Nadu, India

³Assistant Professor, School of Civil Engineering Vellore Institute of Technology Vellore.

Abstract - It has been generally perceived that Building Information Modelling (BIM) is a standout amongst the most progressive advancements that speaks to a mechanical and procedural move inside the Architecture, Engineering and Construction (AEC) industry. BIM is a process which integrates all the firms to work together for the completion and helps to get in digital format throughout the building lifecycle. Although the benefits of BIM are evident, the adoption in the Indian Context Industry has been slow and the diffusion has not been to its full capacity. To shed light on adoption of BIM in India, the research presented in paper has aimed to examine and analyzed the current scenario of BIM in India. The analyzed work will be through the web questionnaires survey which are based on Technological-Organization-BIM Functions- External-Critical success factors (TOBEC) framework. Based on survey results, recommendations for increasing BIM adoption will be provided. These will help to develop and improve on the potential of BIM in Indian construction industry.

Key Words: AEC, BIM, (T-O-B-E-C) framework, Indian Construction firms.

1. INTRODUCTION

As indicated by the new examples and the new age in the constructional fragment, the execution and the digitalization in the advancement business is the champion among the most basic perspectives. As a result of the digitalization and the most dynamic thing that can be happen in the advancement business, suggests the general cost and profitability of the endeavour. While executing the new thing, the Building Information Model (BIM) is spine of the digitalization in the improvement business. BIM is just the strategy in which the assorted programming that can be used at a single point to upgrade the conflicts related to the endeavour. While executing the BIM framework which cover each one of the parts incorporating into the improvement like the progression of the models, cost examination, controlling, checking the endeavour with the pilot show. The diverse BIM logic can be made depend on the structure of the association and the distinctive model like T-O-B-E-

C. As a result of some nonattendance of the care and mental, So the execution of the BIM up to the fundamental

establishments of the advancement business. To beat the couple of drawbacks related to the execution of the BIM we have to see the issues which impact the use of the BIM.

A. Literature review

A few examinations have been led in different parts of the world to comprehend BIM selection which rule explanation behind the investigation adventure was to collect information on viable change practices in development industry from existing examination and from people from the business. The investigation was coordinated to give people of the outlining and improvement industry with information on the sorts of supportability sharpens that are being executed what's more, on why they are being executed on constructional businesses undertakings and to offer information to help the basic leadership shapes concerning the use and evaluation of supportable practices on present day advancement adventures. Several studies have also been conducted in order to understand the factors affecting BIM [1] There are a few hypotheses of innovation dispersion and reception, especially concerning data frameworks (Sharma and Mishra 2014). Numerous papers have featured that innovation reception isn't just a capacity of the productivity of the innovation but at the same time is needy on attributes of the client (Venkatesh et al. 2014), social state of mind (Fishbein and Ajzen 1975), trust (Gefen and Straub 1997) and other causal variables (Thompson et al. 1991). [2] This paper contain the writing on BIM reception is audited to distinguish the key boundaries to utilizing BIM adequately on location. This area finishes up by proposing a methodology for BIM selection that couples BIM with lean development rehearses. The following segment depicts how this methodology was executed on a continuous development venture in India in the consequent areas. [3] Building Information Modelling (BIM) seems, by all accounts, to be the following developmental connection in task conveyance inside the AEC (Architecture, Engineering and Construction) Industry. There have been a few studies of usage at the neighborhood level however to date little is known about the global setting. This paper is a fundamental report of an expansive scale electronic review of the usage of BIM and the effect on AEC venture conveyance and undertaking partners in Australia and globally. National and local examples of BIM utilization will be recognized. These examples will incorporate disciplinary clients, venture lifecycle stages, innovation integration- including programming similarity—and hierarchical issues, for

example, HR and interoperability. Additionally considered is the present status of the incorporation of BIM inside tertiary level educational program and potential for the making of another control.[4] The usage of BIM innovation is in no way, shape or form break even with in various nations everywhere throughout the world. This investigation includes the finding of mindfulness and selection of BIM in various nations on the planet, for which 8 unique nations were embraced which have vast development showcase. The review information is gathered from various research records, Smart Market report, NBM National BIM reports and BIM overviews. The mindfulness and appropriation of BIM in various nations is thought about and plotted, it was discovered that mindfulness and selection of BIM in North America is 71% giving most noteworthy rate while in India it is at least level of mindfulness and reception i.e. 22%. This paper investigates the status of BIM in rate clients, heard however not utilizing and non-client in various nations on the planet.[5] This think about plans to distinguish factors that influence the BIM reception process in little and medium size development associations (SMOs) as far as selection inspirations, simplicity of usage and authoritative competency. Quantitative and subjective data are gathered through review what's more, vis-à-vis meeting of development SMOs in Australia. Auxiliary Equation Modelling is utilized to measure the connections between powerful factors furthermore, association's goal towards BIM use. The outcomes displayed in this paper intend to give an understanding into the necessities and worries of SMOs with respects to BIM appropriation. From refereeing these research papers we built up our TOBEC structure for the effective working of the BIM process.

B. Research methodology:

For deciding the momentum utilization BIM in undertaking booking and task arranging in Indian Construction industry, a quantitative and subjective overview look into strategy was embraced. The overview was led as poll and was sent to development experts including Architects, Engineers, Developers, Contractors and Sub- Contractors. The point of this methodology isn't to emphasize existing frameworks of BIM utilize, however to pick up a more inside and out comprehension on the utilization of BIM and give up and coming data on its general frameworks association with the AEC business. The principal purposes behind utilizing a joined, subjective and quantitative research approach is because of its capacity to base true avant-garde information (quantitative) gathered while incorporating the ideas and learning base procured from the subjective scholarly investigation. This can additionally help with contrasting the up-with date subjective data assembled from the overview in recognizing the line between the hypothetical capabilities of BIM to certifiable situations. The TOBEC frame work was used to develop a survey instrument for collecting primary data from industry experts. The questionnaire was performed in Google Docs Form and was sent over 55.

Construction professionals. The Non-BIM client's area contains questions which enable this investigation to draw advocated ends on the absence of BIM joining for different purposes for this and additionally their readiness to adjust for the BIM upset.

2. Information regarding Respondents

The review brought about helpful bits of knowledge on the present status of BIM utilization and reception inside Construction firms in India. The review demonstrates that out of the aggregate 29 finish reactions, 13.8% of the respondents have over 12 years of expert involvement in the business and 16% of the respondents have proficient experience somewhere in the range of 8-12 years. As the vast majority of the respondents had over 10 years of experience, this proposes the respondents had a comprehensive learning of the Indian AEC industry. 72.4% of the total respondents revealed that they were utilizing BIM in their associations and half of the respondents revealed that their association is not utilizing BIM. Non-adopters were steered to an alternate segment of the review where they were requested to react to the BIM appropriation questions in view of their current comprehension and observations.

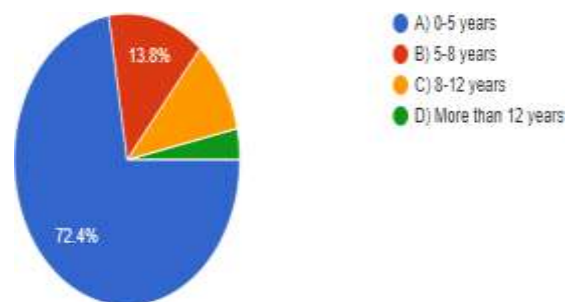


Fig.1. Information about Respondents

Technical parameters:

The change from conventional practices towards BIM has empowered a few advantages to AEC industry as for the task conveyance. According to the development 2025 targets, BIS, HM Government 2013, execution of BIM advancements and work processes in the AEC undertakings can diminish in the underlying expense of development and the entire life cycle cost up to half, lessen ozone harming substance emanations in the developed condition to half and decrease in the general time by half, from initiation to culmination, for new form and restoration resources. With such a huge speculation occurring in Indian AEC ventures, it is especially basic to diffuse the BIM advancements and work processes by receiving institutionalized techniques. For this to happen it is a fundamental necessity to unite Indian AEC industry and training network to learn and diffuse BIM advances and procedures in Indian AEC ventures, generally speaking assisting the Indian AEC industry with growing. Indeed, even

from the review information of the respondents, the entire use of BIM needs in undertaking conveyance. Just 17.2% of the aggregate respondents has executed on a superior scale in the venture. Out of residual respondents 8% still thinks the abuse of BIM process could be made on full scale if boundaries can be disposed of.

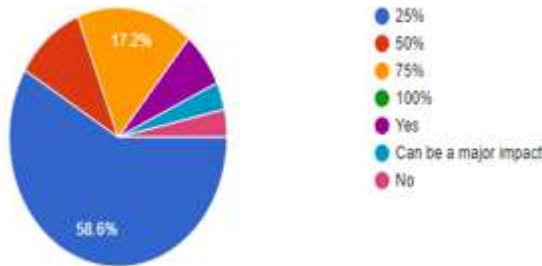


Fig. 2 Technical Parameter

Table.1. Technical Barriers

High Software Cost
Standard Guidelines for implementation in project
Hardware Requirements

Internal (Organisational) Barriers

Authoritative competency can be estimated in following zones: hierarchical help, aptitude, and association goal. Authoritative Support: This term is characterized as how much an association's approach bolsters BIM use. Past investigations demonstrate that top administration bolster, including giving preparing and urging staff to utilize BIM in day by day work, is basic to BIM appropriation. The survey incorporate customer driven constraints, less significance for BIM reception from different groups in venture and absence of gifted workforce for working BIM instruments. To start with, Indian Clients are not asking for the utilization of BIM in the task conveyance. It is their conviction that on the off chance that they change the agreement to BIM, they won't get aggressive offers, constraining their potential pool of bidders and at last expanding the undertaking cost. Second, other colleagues are not requesting the utilization of BIM to build up an undertaking configuration show or data extraction nor for utilization of models in administration conveyance. The greater part of the BIM arrangement suppliers in India are conveying BIM answers for universal customers. It is particularly fundamental for Indian customers to understand the advantages of BIM selection for their activities. BIM distributions recorded in the primary section gives a gritty comprehension towards advantages of BIM. Third, dominant part of the accessible work force in our

AEC industry are not in the know regarding BIM and the individuals who are capable are difficult to reach.

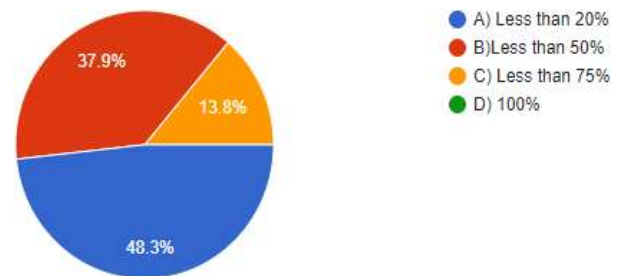


Fig. 3 Internal (Organizational) Barriers

Table.2. Internal (Organizational) Barriers

Lack of expertise workforce to operate BIM tools
Clients-driving limitations
Negligence to BIM adoption from team members

From the survey respondent, the satisfaction level of the BIM implementation varied due ineffective functioning of team member's .out of the total respondents only 13.8% are satisfied with high adoption that is also due third party driving scales. The survey also highlights the barriers (table 2) associated for satisfaction of BIM process within the organization.

BIM functions

Building Information Modelling (BIM) has restructured much of the construction industry by encouraging collaboration between various disciplines. However, due to an absence of common financial standard for various BIM functions (clash detection, 4D modelling, facility management, and energy analysis) decision regarding adopting BIM functions are usually made based on market condition or on a manager's intuition. While larger firms can afford such a trial-and-error process, the cost burden on small- to medium-sized firms is significant. Therefore, our work assembles the data of established BIM users into a simple algorithm to help new BIM users understand the advantages and disadvantages of implementing BIM functions in a project.

From figure it is obvious that BIM is getting trust in the business firms. Anyway the dispersion is at slower rate however on the off chance that the obstructions are wiped out with the general standards, there would be a total change in coming a very long time in the nation.

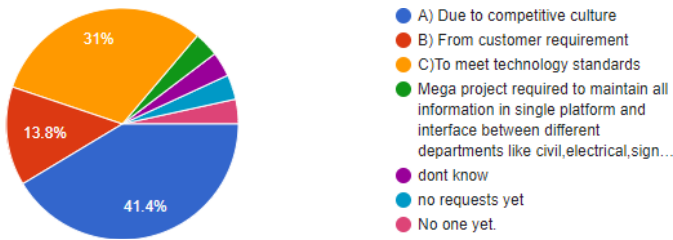


Fig 4: BIM Function Parameters

Table -3: BIM Function Parameter

Roles and responsibility
Inefficient regulatory
Change in the mindset and practice information use

Critical Success Factors

Information development (IT) has a critical activity in redesigning forcefulness in the development business where there has been a high number of challenges. It incorporates the capacity of value staff, preparing of representative, powerful administration, and the accessibility of money related assets, the coordination among the undertakings, the administration's plans and the prerequisites of the customer. Nearness of government-drove exercises to progress BIM execution inside the business.

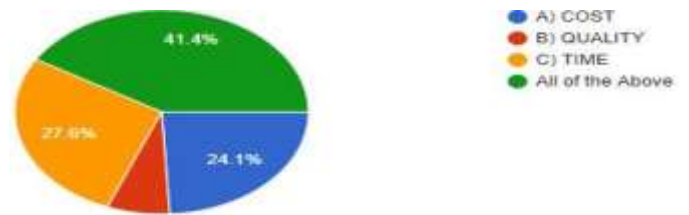


Fig 6: Critical Success Factor

Table 5: Critical Success Factor

Absence of BIM training and education
Skill Issue
Associates efforts

The critical success factors for some BIM users was high in above parameters just because the companies have eliminated certain barriers which are mentioned below.

3. CONCLUSION

Demography of Indian populace uncovers that, Sixty-five percent of the populace is under thirty- five years old gathering and half of the Indian populace is about the age gathering of twenty-five, which speaks to India as an incredibly youthful nation. Two hundred and twenty-six million are in the age gathering of ten to nineteen entering advanced education, it's a positive sign wherein rest of the world is maturing. Constantly 2020, the normal time of individuals in Japan will be 47, china heading towards 40, Europe towards 46 and India will be 29. This implies we have more potential individuals who are gainful and dynamic youthful populace prepared to work. BIM is a standout amongst the most evident parts of a profound and central change that is quickly changing the worldwide development industry. As it's been expressed in the ongoing writing, BIM inquire about is primarily focused on enhancing models' capacities of obtaining, putting away and sharing the development related information. These upgrades not just build its data administration capacities yet in addition give BIM a job as a facilitator for new innovations and building strategies. When contrasting the connected procedure and the conventional AutoCAD strategies, a major contrast can be

External (Environmental) Factors

Ecological elements considered in this examination involved customer prerequisites, exchange accomplice availability and administrative help. Non-availability of state incentives for BIM adoption has been thought-about as another hurdle for effective BIM adoption in country. According to literature legal concerns is another aspect where the government implementation is mandatory to run processes efficiently. The review information from figure displays the effect of BIM in the venture. These effects can be enhanced if Government demonstrates enthusiasm for the procedure. From the writing it is apparent that the effect execution of BIM utilization in European nations is high because of legislative bodies' inclusion.

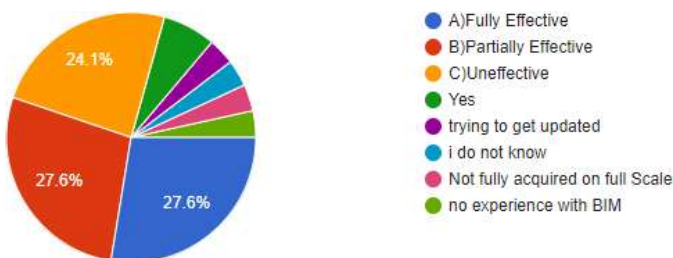


Fig 5: External (Environmental) Factor

Table -4: External Barriers

National Building Codes
Liability and copyright issues
Third party dependence for accuracy of BIM models.

noted, with extraordinary advantages for the planner. The utilization of BIM instruments as a method for strife investigation displays an unquestionable favorable position over customary strategies. The exploration discusses hindrances which can be dispensed with honesty of both legislative and non-administrative associations and putting resources into youth to get results in expansive terms.

4. REFERENCES

- [1] [1] Ahuja, R., Sawhney, A., Jain, M., Arif, M., & Rakshit, S. (2018). Factors influencing BIM adoption in emerging markets-the case of India. *International Journal of Construction Management*, 1-12.
- [2] [2] Mahalingam, A., Yadav, A. K., & Varaprasad, J. (2015). Investigating the role of lean practices in enabling BIM adoption: Evidence from two Indian cases. *Journal of Construction Engineering and Management*, 141(7), 05015006.
- [3] [3] Gray, M., Gray, J., Teo, M., Chi, S., & Cheung, Y. K. F. (2013). Building information modelling: an international survey.
- [4] [4] Shaikh, A. A., Raju, R., & Malim, N. L. (2016). Global status of Building Information Modeling (BIM)-A Review. *International Journal on Recent and Innovation Trends in Computing and Communication*, 4(3), 300-303.
- [5] [5] Hong, Y., Sepasgozar, S. M., Ahmadian, A. F. F., & Akbarnezhad, A. (2016, January). Factors influencing BIM adoption in small and medium sized construction organizations. In *ISARC. Proceedings of the International Symposium on Automation and Robotics in Construction* (Vol. 33, p. 1). Vilnius Gediminas Technical University, Department of Construction Economics & Property.
- [6] [6] Pang, Y., & Zhai, D. (2018). Research on the Influencing Factors of the Adoption of BIM Technology. *World Journal of Social Science Research*, 5(1), 82.
- [7] [7] Jung, W., & Lee, G. (2015). The status of BIM adoption on six continents. *International Journal of Civil, Environmental, Structural, Construction and Architectural Engineering*, 9(5), 444-448.
- [8] [8] Panuwatwanich, K., & Peansupap, V. (2013, July). Factors affecting the current diffusion of BIM: a qualitative study of online professional network. In *Creative Construction Conference*, Budapest, Hungary (pp. 6-9).