

Review Paper on Application of building information modelling in construction project in coordination with digital transformation

Majaz Sheikh, Prof. K.H. Ghorpade

ME Student, Construction & management, Trinity Academy of Engineering, Pune- 048, Maharashtra, India

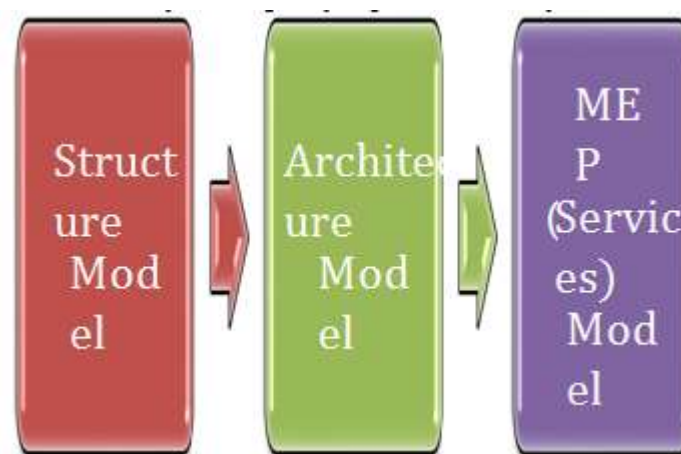
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ABSTRACT: Building Information Modelling essentially means developing a system which can house or manage all the information needed in a particular project in a single DATA REPOSITORY that could be accessed by all project participants and readily incorporated into all project documents. BIM is a type of technology, that is, how to reuse information to carry out the construction activities. At the same time BIM is a kind of thinking, how to analysis whole process, how to use the analysis of the problem and solve the problem of thinking. BIM is the abbreviation of building information model. Building information model integrated geometric model information, functional requirements and performance of all components, the use of all the information the whole life cycle of a building model covers separate structure within the project, including the process of information, such as the

construction schedule, construction process, maintenance management and property management etc. BIM technology is a important platform (integrated professional information model, field model, mechanical model and temporary model, schedule, budget, drawings and other business data (three) the direction of technology, production, business), five core (integrated model, construction simulation, schedule control, cost control, quality tracking and management, ten application: basic application; pipeline management, construction simulation, schedule control, volume and price inquiry, material extraction, animation disclosure, quality tracking, drawings management, collision detection. As an important tool of information management, work efficiency can be greatly improved. Basically there are three types of Models made as follows



- Structural Modelling helps to quantify the structural elements of project like PCC, RCC, Footing, Slabs, and Columns etc.
- Architectural Modelling helps to quantify the architecture elements of project like Brickwork, GRC, and Doors & Windows etc.
- Services Modelling helps to quantify the services elements of project like Ducts, sprinklers, Cable trays, pipelines etc.

BIM has a group of software's which are used to share the information with other so work in more simplified and efficient manner in which information can be Extracted, Exchange or Networked to support decision making regarding a building or any built asset. BIM can optimise overall construction time by highlighting bottlenecks & site constraints during construction work. In the USA, since 2007, it is mandatory to use BIM within the design process on any project funded by the GSA. Integration of BIM within the process may not reduce design & documentation time, but can minimize the efforts time and money required during the various construction phases. Moreover, good use of BIM improves participants efficiency & effective collaboration, thus speeding-up the entire process & produces operative information to run the facility.

A review of literature focusing on BIM in India shows limited adoption of the same by the construction industry. Even today more than 90% of the architectural & construction firms are using 2D CAD based tools for designing & development of the project. It was found that some organisation are proposing integration of BIM based tools during bidding stage, however these tools are not the part of design development stages and other stages despite realizing the benefits such as improved efficiency. There are Various Software's as Part of BIM Technology.

- Architecture: Autodesk Revit Architecture, Graphisoft ArchiCAD, Nemetschek Allplan Architecture, Gehry Technologies.
- Structures: Autodesk Revit Structure, Bentley Structural Modeler, Bentley Ram, STAAD & ProSteel, Telka Structure.
- Services – ArchiCAD, Revit MEP, Navisworks etc.

Plan, acquirement, development as well as combination in E.P.C. mode and work with the utilization of BIM, it can understand the plan, acquisition and development of community work, abbreviate the development time, improve the board effectiveness, to accomplish incorporation,

development project data the executives. so the EPC is general contracting mode, the plan side and development side as an association, the plan side through the BIM application essentially improve the presentation of the structure and less change, improve creation the board effectiveness, it could diminish development expenses to improve the development Stage of the beneficial rate, from the development stage to acquire the pay outside the plan charge; the development side can be in the plan side with the help from the major lower development costs, the development phase of the net revenues. All in all, in the EPC mode plan and development overall can accomplish shared advantage and shared benefit advantages can advance the utilization of BIM to give an amazing main impetus. This model is likewise appropriate for China's present development project advancement of the general prerequisites.

I. INTRODUCTION

The digital transformation change is available today, to a more prominent or lesser measure, in all enterprises and useful areas. This change impacts on two levels: advancement in plans of action, making new items and administrations empowered by digitalization, and an improvement in operational cycles, expanding effectiveness and results because of innovation. In the architecture, engineering and development industry (AEC), albeit a few changes in the plan of action are additionally occurring, for instance because of the execution of BIM and related technologies, this change is primarily cantered around improving tasks. Nonetheless, the eccentric model of the area and the difficulties looked by the supervisors and heads of these organizations enormously condition the right turn of events and effective execution of digitalization drives.

Inside the AEC industry, the plan and designing territories are without a doubt the most exceptional as far as the execution of digital arrangements. In any case, in spite of the presence of various innovations, like the utilization of robots, robots, astute devices, and so forth, actual development has acclimatized a couple of changes and remains primarily a simple interaction. This implies that, practically speaking, the development area stays one of the least digitized on the planet. This is generally because of the particularities of the business, like the contribution of numerous subcontractors and providers, regularly with low innovative abilities and little interest in joining new working techniques in the brief time of an undertaking. This isn't to make reference to the huge assortment inside the actual ventures, which makes

it very hard to foster devices and strategies that can be applied in a normalized way. Then again, AEC organizations will in general have rather restricted R+D+I spending plans, which at last practically rules out the digital transformation.

Some of the main technologies that can help the transformation of the sector and increase its efficiency and productivity could be:

1. The implementation of the BIM methodology, advancing in the implementation of all its dimensions, until reaching the BIM 7D, focused on the subsequent management of the buildings, or even higher levels focused on the efficiency of the operations to contribute added value to the maintenance of the buildings and facilities.
2. Tools for digital collaboration and mobility that help to overcome problems in the relationship between the different actors in the projects, both internal and external.
3. Quality control systems and management of safety and regulatory processes.
4. Applications to improve real-time information flows and interoperability with other systems.
5. Process automation systems.
6. The use of the Internet of Things (IoT).
7. Advanced data analysis.

The implementation of these technologies is intended to improve aspects such as efficiency, sustainability or costs, which are vital to ensure a return on investment and a significant improvement in the results of the organizations.

One of the principle difficulties of digitization in any organization, and especially in those in the AEC area, is to accomplish an unmistakable meaning of the targets of the transformation undertaking and how these progressions will make an incentive for the organization. During the advancement of the activities, it is fundamental to zero in so much or more on the operational and business measures as on the actual innovation.. Potentially improving joint effort between the various entertainers all the while, from plan to development and support, is quite possibly the most basic angles to be tended to.

Think for instance of a building site where there are different imperfections in the materials and items sent by a specific provider, yet which are not conveyed simultaneously, creating quality issues, postponements and cost invades. Utilizing BIM models in a typical information climate (CDE), and giving admittance to it to all entertainers, permits labourers to name blemished items and the provider to get such notification continuously. This permits you to analyse and lessen surrenders prior to making

new conveyances so both the task and everything gatherings can profit.

The most creative development organizations depend on innovation accomplices who give apparatuses that each colleague can use to team up more viably, permitting tasks to remain on time and inside spending plan. The utilization of these apparatuses permits organizations to improve their intensity, expanding their incomes and improving outcomes and benefits for organizations, proprietors, financial backers, subcontractors and labourers. While picking the correct IT arrangements, it is significant anyway to maintain the emphasis on taking care of genuine business issues and difficulties, with the goal that innovation is a way to tackle them and not an end in itself. A portion of these difficulties might be Finish on time and more efficiently. Time and customer expectations are getting shorter and shorter. Provide greater added value for building maintenance. Improve control and safety and regulatory processes. Problems in the relationship between parties (internal or subcontracted) that need to improve collaboration. Shortcomings in real-time information Over the past few years, sensors and various hardware as well as software have been increasingly cost-effective and efficient, allowing for new possibilities. The technologies available on the market are more numerous than ever before (such as virtual and augmented reality).

Over the past few years, sensors and various hardware and software have declined in cost and risen in efficiency, opening the door to new possibilities. The number of technologies available on the market has increased (e.g., virtual and augmented reality).

Technologies have improved their performance and efficiency in recent years, allowing for new possibilities. Sensors and various hardware components, as well as software, have seen a cost drop and an increase in efficiency. New technologies (including virtual and augmented reality technologies) have been launched in recent years.

Since sensors and hardware have become more efficient and cost-effective, this has led to new possibilities. Different types of hardware and software have been developed over the last few years, enabling new technologies to be developed. Technologies are now available in greater numbers (like virtual and Augmented Reality).

Technological advancements have resulted in cost reductions and efficiency gains, resulting in new possibilities. We now have more technological possibilities than ever before. There are more

options available on the market (like virtual and Augmented Reality).

The development of sensors and devices as well as related hardware and software has gone on at a rapid pace, reducing costs and enhancing efficiency in the last few years. Technologies available on the market are more numerous than ever before (as well as virtual and augmented reality).

Technologies have blossomed over the past few years with sensors and various hardware as well as software's cost dropping and efficiency increasing. New technologies are available on the market than ever before (such as virtual and augmented reality).

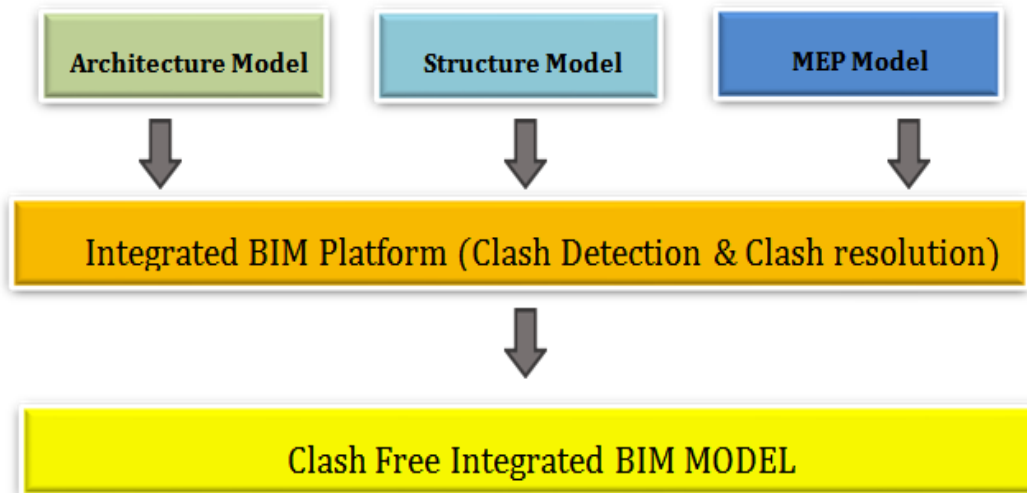
In recent years, sensors and different types of hardware and software have seen prices drop and efficiency rise, opening new possibilities. The variety of technologies available on the market is more varied than ever before (such as virtual and augmented reality).

Since Sensors and various hardware as well as software have seen their prices drop, they've

become more efficient and opened the way to new possibilities. Technologies available on the market now are more diverse than ever before (such as virtual and augmented reality).

New technological capabilities Sensors and various hardware and software have seen cost drop and efficiency rise over the past few years, offering new opportunities. Technologies are now more numerous than ever before (such as virtual and augmented reality)

. Many new jobs, not yet known, will be created in the years to come with the adoption of new tools and processes. Booming start-up environment Startups have taken advantage of the market opportunities induced by some of these trends to fill newly created added-value gaps. Oliver Wyman has identified nearly 1,200 Startups worldwide since 2010 in real estate and construction. These startups have received around US\$19.4 billion in funding over the period, half of it in 2017.



There are different dimensions known as Level of Development from LOD 100 to LOD 500 as explained below

- LOD 100 Concept - In Level 100 the geometric info in the model, elements and only symbols with attached information.
- LOD 200 Design Development - A general model where elements are modelled with approximate quantities, size, shape, location and orientation

- LEVEL 300 Documentation - In Level 300 the models can be used to generate construction documents & shop drawings.

- LEVEL 400 Construction - In Level 400 supports detailing, fabrication & installation assembly.

Level 500 Facility Management - The model have suitable geometry and information to support operations and maintenance.



REFERENCES

- [1]. Li Songdong. EPC general contracting model design management research. *construction economy*, 2012 (7): 68-70.
- [2]. Wang Shuangjun. Combined with the research on schedule management mode of housing industry EPC engineering BIM technology, 2016 (7): 46-60.
- [3]. Liu Huan, Liu Shangyang. BIM technology applied to the total contract cost management advantage points Analysis of. *building economy*, 2013 (6): 31-34.
- [4]. Tang Xiaoling, Tian dawn. Building information model (BIM) technology diffusion and Application Research Study. *building economy*, 2013 (6): 98-100.
- [5]. Liu Wenping. BIM EPC in Guo REDCOLLAR in highway engineering application mode of. *construction economy*, 2014 (9): 31-34.
- [6]. Shen, W.; Tang, W.; Wang, S.; Duffield, C.F.; Hui, F.K.P.; You, R. Enhancing Trust-Based Interface Management in International Engineering-Procurement-Construction Projects. *J. Constr. Eng. Manag.* 2017, 143, 04017061. [CrossRef]
- [7]. Du, L.; Tang, W.; Liu, C.; Wang, S.; Wang, T.; Shen, W.; Huang, M.; Zhou, Y. Enhancing engineerprocure-construct project performance by partnering in international markets: Perspective from Chinese construction companies. *Int. J. Proj. Manag.* 2016, 34, 30–43. [CrossRef]
- [8]. Galloway, P. Design-Build/EPC Contractor's Heightened Risk-Changes in a Changing World. *J. Leg. Aff Disput. Resolut. Eng. Constr.* 2009, 1, 7–15. [CrossRef]
- [9]. Shen, W.; Tang, W.; Yu, W.; Duffield, C.F.; Hui, F.K.P.; Wei, Y.; Fang, J. Causes of contractors' claims in international

- engineering-procurement-construction projects. *J. Civ. Eng. Manag.* 2017, 23, 727–739.
- [10]. Aldhaferi, M.; Bakchan, A.; Sandhu, M.A. A structural equation model for enhancing effectiveness of engineering, procurement and construction (EPC) major projects: End-user's perspective. *Eng. Constr. Archit.Manag.* 2018, 25, 1226–1252. [CrossRef]
- [11]. Digital transformation necessitates change for EPC firms – Report from EPC world
- [12]. IHS Herold Global Project Database 19 November 2013
- [13]. Mubarak S 2015 *Construction Project Scheduling and Control* (New Jersey: Wiley)
- [14]. Nicholas J and Steyn H 2012 *Project Management for Engineering, Business and Technology* (Oxon: Routledge)
- [15]. Koo B and Fischer M 2000 Feasibility study of 4D CAD in commercial construction *J. Constr Eng. Manag.* 126 4 p 251-60
- [16]. Swapnesh P R and Valunekar S S 2017 Improve the productivity of building project using building information modelling (bim) based 4d simulation model *IJRASET* 5 p 45-98
- [17]. Pitake S A and Patil D S 2013 Visualization of construction progress by 4D modeling application *IJETT* 4 p 3000
- [18]. Boton C, Kubicki S and Halin G 2015 The challenge of level of development in 4D/BIM simulation across AEC project lifecycle. A case study. *CCC* 2015 123 p 59-67
- [19]. Elshakour A H A, Al-Sulaihi I A, Al-Gahtani K S 2012 Indicators for measuring performance of building construction companies in Kingdom of Saudi Arabia *JKSUES* 25 p 125–3
- [20]. John D D 2018 *Building Information Modeling (BIM) Impact on Construction Performance* (Georgia: Georgia Southern University)