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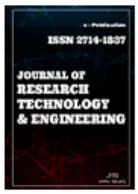

BIM Adaptation in Construction projects

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Abstract: The construction industry is one of the large industries that significantly contribute to the country's economy. Because construction projects are so complex, one of the most significant aspects is project management. It necessitates interdisciplinary team collaboration and communication, effective cost and time management, operational efficiency, and project design and quality improvement. Building Information Modeling (BIM) has lately acquired popularity in this respect to achieve effective project management. The construction actors engaged in the project will be able to plan, design, and coordinate more efficiently if they use this technology. The aim of this paper is to show how BIM may help improve project performance in terms of time, cost, quality, productivity, and safety.

Index Terms: Building Information modeling (BIM), Benefits of BIM, Project Performance, Project management

1. INTRODUCTION

Building Information Modeling (BIM) would be a computerized representation of an office's physical and practical characteristics. A mutual information asset for data about a BIM is an agreeable, dependable reason for choices during its life cycle makes; early treatment has been characterized as being from first preparation [1]. Fundamental implementation of the BIM is the collaboration of various partners at different stages of the life cycle of a facility to insert, remove, update or modify data in the BIM to support and reflect the role of that partner [2]. To provide modern assistance, the functions of development experts should be adjusted by supervising 3D, 4D time, 5D cost demonstration, and 6D offices and sharing cost data/information with the project group. IM integrated project distribution approach [3].

The building is built and designed after the BIM application is not stopped, and then the phase of operation and maintenance begins. Use BIM to demolish the building and renewal in the future [4].

The idea of BIM can be traced back to the early enrollment during the 1960s, and during the 1970s and 1980s, the powerful show software began to emerge. AutoCAD programming for the advancement of the program in 2000 for viable usage went through a change. The execution of BIM has carried critical advantages to the development business, and yet it has significantly affected its practices, contract strategy, and action plan. It reshaped organizations and associations. BIM execution includes various difficulties, and specialized difficulties, board difficulties, and ecological, monetary, and legitimate dangers [5].

The justification for the BIM usage is to make a unified shared information base with all the vital plans and operational data about a project [6]. 3D innovation utilized to introduce configuration projects, with no genuine on-location application and no cooperation between colleagues to run its application. BIM has taken this idea to the following level by utilizing designing and structural information to make 3D models about making models with cutting-edge 3D plan programming this permits a 3D model refreshed by adjusting the information base with particulars, yet not the specific model. With this bit of leeway, BIM is utilized to identify and diminish mistakes and configuration clashes, and project demands (RFI) [7]. There is also the benefit of maintaining a predictable information arrangement by integrating the data set, which reduces the uncertainty that occurs as various specialists decipher data [8].

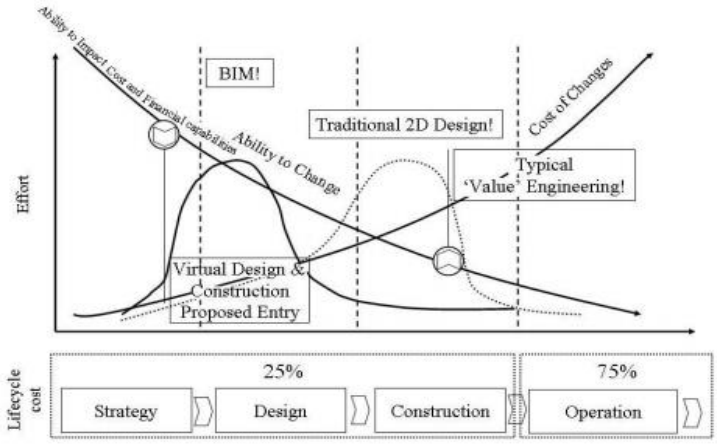

Fig. 1 Opportunities gained through BIM [6]

The development project measure is commonly broken into three particular classifications of its lifecycle, and it is characterized as follows: [9]

- Pre-Construction – designing, costing, project planning, and scheduling
- In-Construction – project budget and schedule management, human resource management and other resource allocations, site management (materials, equipment, safety, logistics, etc.) with its various phases
- Post-Construction – facility management, maintenance, and operations

2. BIM DIMENSIONS

An essential Building Information Model is an object-oriented 3D model which has different applications and utilizations in various project stages but, it isn't restricted to that, it very well may be a 4D, 5D, or nD model (Naim, 2018) expanding the BIM applications all through the project life cycle.

- 2D BIM : BIM model is 3D, but it very well may be utilized to create 2D drawings and document [10].

- 3D BIM : Item arranged 3D geometric models with embedded insight, semantic, practical, and execution data which can be utilized for visualization, navigation, clash detection, design interrogation [11]
- 4D BIM : Partner time (Schedule) with geometry transform a 3D BIM model into a 4D model that can be utilized to simulate creation gathering and progress observing [12].
- 5D BIM : Adding cost and budged data to a 4D BIM model is called 5D displaying, making a 5D BIM model for automated estimation and cost management [13].
- 6D BIM : 6D BIM model contains procurement, supply chain information, and production information. An as-built model or FM model is also called a 6D model [12]
- 7D BIM : Incorporation of supportability parts and related data in a BIM model makes it a 7D model [13]
- nD BIM : An nD BIM model is theoretical and indicates that the applications of BIM model are numerous and can achieve any number of dimensions in future [9]

3. LEVEL OF DEVELOPMENT

- LOD 100 : The Model Element might be graphically addressed in the Model with an image or other generic representation. Data identified with the Model Element can be gotten from other Model Elements. Any data got from LOD 100 components should be viewed as rough [14].
- LOD 200 : The Model Element is graphically represented within the Model as a generic system, object, or assembly with approximate quantities, size, shape, location, and orientation. Any data got from LOD 200 components should be viewed as estimated [14].
- LOD 300 : The Model Element is graphically addressed inside the Model as a particular framework, item or gathering as far as amount, size, shape, area, and direction. Non-graphic data may likewise be connected to the Model Element. The task source is characterized and the component is found precisely concerning the venture starting point [14]
- LOD 350 : LOD 350 the Model Element is graphically represented within the Model as a specific system, object, or assembly in terms of quantity, size, shape, location, orientation, and interfaces with other building systems. Non-graphic information may also be attached to the Model Element[15]
- LOD 400 : LOD 400 The Model Element is graphically addressed inside the Model as a particular framework, article or gathering as far as size, shape, area, amount, and direction with itemizing, manufacture, get together, and establishment data. Non-realistic data may likewise be connected to the Model Element [16].

- LOD 500 : LOD 500 The Model Element is a field verified representation in terms of size, shape, location, quantity, and orientation. Non-graphic information may also be attached to the Model Elements [13].

4. ADVANTAGES OF BIM

The various Advantages of BIM adoption are as follows,

- Maximum efficiency - One of the most significant benefits of BIM is that construction projects have a shorter life cycle and are more efficient. It becomes easier to organize and finish all parts of the pre-construction and planning phases. Architects may use BIM software to develop designs faster, while estimators can use BIM models to provide more accurate estimates. BIM plans also provide considerably greater cooperation and communication among the project's many stakeholders [12]. It enables diverse experts to access BIM plans whenever they need them, ensuring that everyone is working with the most up-to-date model possible. This reduces the number of mistakes and rework caused by erroneous or inaccurate data.
- Better Project Performance - The use of BIM can vastly enhance the organization's project performance. BIM's multi-dimensional aspects aid in construction projects in terms of time, cost, quality, safety, and efficiency. BIM decreases the project's construction cost. It also enhances project quality by minimizing various difficulties and, on the other side, boosts productivity [15].
- Improved the cost estimation - Estimators can get considerably more reliable data when they use a comprehensive model. If we glance at such a 3D model rather than a 2D blueprint, you receive a much more detailed plan to work with. As a consequence, cost estimates based on models are more realistic and precise. It also speeds up the estimation process by providing quicker access to the information and resources.

  BIM can improve more than simply cost projections. Quantity takeoffs are also made easier with BIM models since they provide a more detailed model to work with.
- Effective clash detection -BIM assists with recognizing 'strife', for example, various components involved in one spot. This happens when more than one development component is found at a similar point in the drawings. For instance, if a pillar is put in the way of cooling units situated by an underlying fashioner MEP engineer, the crash location shows that circumstance as an impact utilizing the 'crash identification' application.
- Scheduling and sequence - BIM is a 4D cycle, for example, 3D in addition to time. It can coordinate individual 3D regions by consolidating project conveyance timetables, including arranging and observing assets and amounts and secluded pre-readiness to help project stages. Notwithstanding cooperation, the 4D reproduction work is utilized as a specialized apparatus to

uncover possible issues. The two organizers and contractual workers can use the BIM on location to check, guide, and screen development exercises.

- layouts and fieldwork - BIM can be exceptionally useful in supporting part and framework formats in the study by supporting a completely incorporated plan. This includes 2D extraction and drawing for 'lifts' like project, subtleties, and dimensional vision, and coordinates with data on quality and security. Also, the auto overview office interprets XYZ directions to the north, east, and elevation focuses, which can be moved straightforwardly to the assessors' hardware.

5. CHALLENGES IN IMPLEMENTING BIM.

BIM has been around for almost two decades, but it has only lately gained traction in the working world. According to several impossibility, BIM technology adoption has been slower than projected. Here are some major roadblocks to BIM adoption in the building industry:

The adoption of the tool by project participants takes time because it is a recent approach. It is due to a lack of technological knowledge and training. The technology is expensive in and of itself. As a result, senior management assistance is critical not just in acquiring software but also in giving enough training and incentive to staff. Because a building project comprises interdisciplinary teams, supporting tools and a user-friendly interface Should also be supplied. Because project participants' access to BIM software is critical to project integration.

6. BIM SOFWARE

There is several BIM software that is used globally. The commonly used BIM software are as follows,

- AutoCAD
- Revit
- ArchiCAD
- Sketch up
- Orion
- Navisworks

7. CONCLUSION

Adaptation of BIM may lead to an effective project completion in all aspects. Focusing on the benefits, all construction companies will make a determined effort to remove the barriers to BIM adoption. BIM software is accessible in a variety of forms throughout the world. Implementing such software will have a positive influence on the project accomplishment, resulting in improved project effectiveness of timeliness, cost, quality, safety, and productivity. It can also aid in the creation of a sustainable project by reducing

trash.

Top management should promote and assist all project participants to use BIM software successfully throughout the project's life cycle by recognizing all of the benefits. More study may be done to determine the trend and level of acceptability of BIM in the worldwide construction industry.

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