Building Information Modeling a New Tool of Project Management for Construction Managers

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ABSTRACT

Project management is a vital part of any project in the world. A better Project management leads any project to its optimum output. For better project management, we must know advance techniques used for project completion in order to have thorough knowledge of all the aspects of resource management. Previously the total project work was bifurcated in different phases like Plan, Design, Bid, Build which required detailed specifications of concerned work, for accomplishing the same, use of 2D drawings, contract documents, Specifications, Codes and Manuals were made. This was the orthodox site delivery method which further became cumbersome in complex projects These traditional construction project delivery approaches hinders the collaborative involvement of the general contractor or the construction manager during the design phase of the project. Then the use of common and traditional two dimensional CAD drawings does not promote a true collaborative approach. Architects and engineers produce their own fragmented CAD documents to relay theirs designs to owners and contractors. These drawings are not integrated and usually pose conflicts of information which result in inefficiency in labor productivity. Moreover, the 2D CAD approach does not promote the integration of the drawings with schedule and cost. To overcome such difficulties of site delivery methods, modern techniques of project management have emerged with greater reliability. Building Information Modeling is also part of the techniques used for project management. BIM represents the development and use of computer-generated n-dimensional models to simulate the planning, design, construction and operation of a facility. It helps architects, engineers and constructors to visualize what is to be built in simulated environment and to identify potential design, construction or operational problems. Hence, Building Information Modeling has attained widespread attention in the Architectural, Engineering and Construction (AEC) industry.

Keywords: Building Information Modeling (BIM), Architect Engineer and contractor (AEC)

1. INTRODUCTION

Project management is a vital part of any project in the world. A better Project management leads any project to its optimum output. For better project management, we must know different

techniques used for project completion and must have thorough knowledge of all the aspects of resource management. Nowadays, we stand in the field, where numerous management tools are available. When utilized correctly, these tools not only assist in the planning, design and construction part of facilities management to save limited funds, but also in the life-cycle management of assets and investments. All these emergent, technological tools will assist with the management of assets. However, a framework of knowledge is also vital to the successful management of project.

Different techniques that were used for project management, made use of Bar Chart, Milestone Chart, Gantt Chart etc. as such, project planning was done accordingly. Meanwhile, the total work was bifurcated in different phases like Plan, Design, Bid, Build which required detailed specifications of concerned work, for accomplishing the same, use of 2D drawings, contract documents, Specifications, Codes and Manuals were made. This was the orthodox site delivery method which further became cumbersome in complex projects. Referring to various literature we came to know that. The construction industry has experienced a gradual decrease in its labor productivity since the early 1960s. In the meantime, the non-farm industries such as the manufacturing industry have increased their labor productivity. The reduction of labor productivity in the construction industry requires more labor hours per contract Rupee amount. This indicates that construction industry is lacking the development for labor saving ideas. The main causes of the lack of labor productivity in the construction industry are related to its fragmented nature due to traditional project delivery approach, traditional use of 2D Computer Aided Drafting (CAD) technology and the size of construction firms First of all, the traditional construction project delivery approach, it hinders the collaborative involvement of the general contractor or the construction manager during the design phase of the project. Secondly, the use of common and traditional two dimensional CAD drawings does not promote a true collaborative approach. Architects and engineers produce their own fragmented CAD documents to relay theirs designs to owners and contractors. These drawings are not integrated and usually pose conflicts of information which result in inefficiency in labor productivity. The estimators need to count and generate their own quantity take offs based on the produced CAD documents. Moreover, the 2D CAD approach does not promote the integration of the drawings with schedule and cost. To overcome such difficulties of site delivery methods, modern techniques of project management have emerged with greater reliability. Building Information Modelling is also part of the techniques used for project management.

BIM represents the development and use of computer-generated n-dimensional models to simulate the planning, design, construction and operation of a facility. It helps architects, engineers and constructors to visualize what is to be built in simulated environment and to identify potential

design, construction or operational problems. Building Information Modeling (BIM) has recently attained widespread attention in the Architectural, Engineering and Construction (AEC) industry What follows is a more detailed introductory look at how building information modeling works in the design, construction, and management phases of the building lifecycle.

2. ROLE OF BUILDING INFORMATION MODELING IN THE DESIGN PHASE

During the course of a building project, an architect must balance the project scope, schedule, and cost. Untimely changes to any of these variables can cost time and money and negatively affect relationships with both consultants and clients. Using traditional methods, access to design- and geometry-related information is usually fairly consistent, whereas cost and scheduling information is available only occasionally because of the time and effort necessary to create it. Using building information modeling techniques, *all* of this critical information is immediately available, so that project-related decisions can be made more quickly and effectively. Building information modeling allows a project team to make changes to the project at any time during the design or documentation process without laborious, low-value recoordination and manual checking work. This gives the team more time to work on design and other high-value architectural problems. In addition, all of the building design and documentation work can be done concurrently instead of serially, because design thinking is captured at the point of creation and embedded in the documentation as the work proceeds.

Whenever a change is made to a project, all the consequences of that change are automatically coordinated throughout the project. This allows the design team to deliver better work faster, because it means that their creation of key project deliverables—such as visualizations and regulatory approval documents—requires less time and effort. The automatic coordination of changes offered by building information modeling eliminates coordination mistakes, improves the overall quality of the work, and helps companies win more repeat business.

3. ROLE OF BUILDING INFORMATION MODELING IN THE CONSTRUCTION PHASE

In the construction phase of the building lifecycle, building information modeling makes available concurrent information on building quality, schedule, and cost. The builder can accelerate the quantification of the building for estimating and value-engineering purposes and for the production of updated estimates and construction planning. The consequences of proposed or procured products can be studied and understood easily, and the builder can quickly prepare plans showing site use or renovation phasing for the owner, thereby communicating and minimizing the impact of construction operations on the owner's operations and personnel. Building information modeling also means that less time and money are spent on process and administration issues in construction

because document quality is higher and construction planning better. The end result is that more of the owner's construction dollar goes into the building than into administrative and overhead costs.

4. ROLE OF BUILDING INFORMATION MODELING IN THE MANAGEMENT PHASE

In the management phase of the building lifecycle, building information modeling makes available concurrent information on the use or performance of the building; its occupants and contents; the life of the building over time; and the financial aspects of the building. Building information modeling provides a digital record of renovations and improves move planning and management. It accelerates the adaptation of standard building prototypes to site conditions for businesses, such as retail, that require the construction of similar buildings in many different locations. Physical information about the building, such as finishes, tenant or department assignments, furniture and equipment inventory, and financially important data about leasable areas and rental income or departmental cost allocations are all more easily managed and available. Consistent access to these types of information improves both revenue and cost management in the operation of the building.

Case study- To get more acquainted with the concept of BIM, we have selected residential building construction works going at district Satara. All the tangible and intangible benefits of using BIM are illustrated through the data provided by 'Suvarna Consultancy Services' who is working as consultant for considered site.

1. Case study : Woodville apartment phase III, Satara.
2. Project name: Woodville apartment phase III, Satara.
3. Project scope: 8.50Cr Residential apartment structure
4. Design concern: RCC designer and architect in Satara.
5. *BIM scope*: Design coordination, clash detection, and work sequencing

Saving in resources: approximately 200 man hours and 5-6% of total project cost was reduced as compared to orthodox site delivery methods.

A building information model is created comprising of the architectural, structural and MEP systems of the proposed building. The model was created during the design development phase using detail level information from subcontractors based on drawings from the designers and different software was used for detailing and designing. Using this model, the project team was benefitted to great extent. As the process of construction is in progress, we have given the latest available reports.

5. REMARKS AND CONCLUSION

After referring different literatures and case study of residential apartment building, we can conclude that this BIM is emerging trend in AEC industries. With the help of numerous software available today in the market, work of simulation and planning the project can be easily done. Though there are few challenges for data risk and data handling, BIM can be effectively use to reduce working man hours and it can detect clashes in projects which ultimately optimises total project cost.

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