"A Paper on Critical Study and Analysis of High Rise Building Using BIM (5D) In AECO Industry"

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Abstract- *Building Information Modelling (BIM) is a remarkable development that has recently engulfed the construction sector globally. It has provided a catalytic means for 'rethinking' the design, construction, and operation of our built environment. BIM when combined with issues pertaining to people, processes and organizations, has the potential to significantly impact the Architecture, Engineering, Construction and Operation (AECO) industry. The aim of this paper is to integrate the time and cost of the project with the 3D model of the structure, thus adding 4thDimension (4D) and 5th Dimension (5D) to the project. The Software used and their system requirements, methodology used by which 5D model of a building can be created. Hence, software like Autodesk Revit, Autodesk AutoCAD, Autodesk Navisworks Manage, Oracle Primavera, and Microsoft Project need to be known. There are various drawbacks in conventional method used for planning, scheduling, procuring and monitoring projects in architecture, engineering, and construction (AEC) industry. Also, the traditional scheduling and monitoring techniques fail to provide a clear view of the ongoing actual work at the project site. This benefits the process of procurement and storage of raw materials required during the project. Thus, with proper knowledge and coordination the project is now transformed into 5th dimension by adding Cost parameter. BIM allows users to use its database management capabilities to maintain and update the construction database. Building Information Modelling (BIM) allows project managers and different people like architects, engineers, consultants, owner, contractor etc.*

***Key Words**: AECO Industry, Building Information Modeling, scheduling and monitoring.*

1. INTRODUCTION

There are various drawbacks in conventional method used for planning, scheduling, procuring and monitoring projects in architecture, engineering, and construction (AEC) industry. Traditional way of planning, scheduling and monitoring is lacking visualization and forth coming impediments in the project. The construction industry has acknowledged that its traditional scheduling and progress reporting practices are in need of substantial improvements in quality and efficiency. The traditional CPM schedule does not provide any information pertaining to the specific detail or context and complexities of the various components of a construction project. Different project members may develop inconsistent interpretations of the schedule when viewing only the CPM schedule. This causes confusion on many occasions and usually makes effective communication among project participants difficult. Slight misinterpretation leads to massive disturbance both on time and cost parameters.

Building Information Modelling (BIM) for project scheduling and monitoring by combining it with the currently used tools like Microsoft Project help in linking of the activities in a critical path method schedule with the corresponding elements of a three-dimensional 3D model transform it into the 4th dimension; thus, making the project sequence easier to understand. BIM provides the user with a real time representation of the project which may improve and speed up the construction planning as well as ensure data integrity and accuracy. By integrating and displaying specification or recommendation and construction resource information, the schedule in BIM promotes interaction and collaboration among the project team members from different fields. This benefits the process of procurement and storage of raw materials required during the project. Thus, with proper knowledge and coordination the project is now transformed into 5th dimension by adding Cost parameter. BIM allows users to use its database management capabilities to maintain and update the construction database.

2. Building Information Modelling –

The word "Building information modelling" is a building design and documentation process. It enables stakeholders to create and manage information about a building project, using the information about the building project which is stored in a 3D model. More importantly, the intelligent data inherent in the building model allows to experience the design before it is real, simulate and visualize design alternatives, analyses performance, and make better informed design

decisions earlier in the process.

2.1 Definition Of Building Information Modelling -

Building Information Modeling (BIM) is an emerging technological and procedural shift within the Architecture, Engineering, Construction and Operations (AECO) industry. Researchers have been investigating the components and repercussions of building product models for many years before the emergence of BIM as a new term. While the mere presence of a label or an acronym is viewed by some researchers as a sign of poor lexical literacy, others refer to names as 'vital for communication and useful for understanding a situation.' Many industry writers and analysts have contested the many terms available while others have argued for the acceptance of BIM as is because of its adoption by industry's major CAD developers. Whether the term itself is useful, agreed upon or contested, BIM is continuing its proliferation in both industrial and academic circles as the 'new CAD paradigm.

3. OBJECTIVE OF STUDY –

- To study fundamental concept of Building Information Modeling, its framework and traditional site working methods through literature survey as well as field visit.
- To plan 3D model using REVIT, scheduling and cost estimation in Oracle Primavera for high rise buildings (above G+5) in construction industry.
- To carry out analysis of selected study area using 5D model in Autodesk Navisworks for time and cost over run.
- To suggest best suitable measures for cost and time reduction as well as comparing traditional methodology and BIM methodology for a building

4. METHODOLOGY –

Following methodology will be adopted-

- To understand the principles and terminologies related to the workspace management through BIM.
- Collection of site information.
- By making schedule and cost estimation, input these either into BIM facilitates the visualization of each project steps combination of 3D model with schedule of project in place.
- Integration of data created in different BIM application to a signal project model (i.e. 5D)
- Deriving a solution for the identified problem by considering the different attributes of the activities, workspace and construction plan.
- Running Final 5D Simulation.
- Suggest best suitable measures for cost and time reduction as well as comparing traditional methodology and BIM methodology for a building.
- Giving result and discussion from data analyzed.

5. STUDY PROCESS-

This study involves mainly following process.

- Collection of site details like floor plans, elevation etc.
- Importing Architectural Design and Creating 3D model.
- Creation of 3D view

- Export 3D model for Autodesk Navisworks Manage
- Creating Work Breakdown Structure
- Allocating resources to the Activities
- Creation of 5D model
- Linking the activities with 3D model
- Simulation of the project

6. SCOPE OF STUDY-

The scope of study is to use the concept of BIM to develop a 5D model by integrating 3D model with time and cost parameters, to assess its potential as a management system for project scheduling and monitoring using a case study of G+14 storage facility.

7. Outline of Thesis

This thesis is consists with following Six chapters

- This chapter discuss the dissertation review, need of study, scope, objective of work and methodology adopted to complete dissertation. Also include efforts have been taken to introduce the topic to considerable extent, its requirement and the way in which project is to be taken forward.
- Literature review focuses on Building Information Modelling (BIM) in brief and explains the concept to considerable extent. This Chapter provides a review on literature in relation to BIM technology, historical development, principle & application of BIM software for creating a 5D model
- This section explains in detail about the BIM software used i.e. Autodesk AutoCAD, Revit and Navisworks and Oracle Primavera. Their review and their system requirements, their modules etc. are mentioned. Various companies that produce BIM software are also mentioned here.
- In this chapter covers the subject of study for this dissertation in detailed form. Also, this chapter explains the work performed in the course of project. The details of the project have been explained step by step in the chapter. This chapter describes the methodology used for creating a 5D model which comprise of a 3D model of G+14 storage facility and its construction schedule and cost.
- The chapter consist of results and reports generated in various tools used in the process of creating a 5D BIM model i.e. Revit 3D, Primavera and Navisworks outputs. A brief discussion regarding the planned schedule is presented as well as results from clash detection are documented.
- This chapter concludes the potential benefits of BIM System as well as barriers is adopting BIM are explained. Also gives the suggestions future improvement.

8. CONCLUSION-

- The proposed methodology utilizes the dynamic linkage between the activities in the schedule, cost and corresponding 3D components and help to detect the incompleteness and logical errors in the schedule sequence.

- BIM provides the stakeholders with a real-time representation of on-going activities on construction site, which helps improve and speed up the construction planning and ensure data accuracy and integrity in the model.

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