Comparative study of application of BIM and traditional method for scheduling

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Abstract **- Construction industry is considered to be one of the most static industry with few little changes from the early 1900's to 2019. Building Information Modelling (BIM) is an emerging technology which is just not a fad, it's a long-term going technology which aids in delivering the projects on time. From first 2D-drafting software sketchpad in 1957 to till date 7-D software such as Revit, Naviswork, Soibri etc. Costing and scheduling are tedious work in any Project Management Consultancy as it involves manually referring to 2-D CAD drawing and then preparing spreadsheets in order to take out quantity which takes a huge amount of time and resources. However, with the emergence of BIM this tedious repetitive process has come to halt. BIM not only provide data rich models to collaborate but also aids in monitoring the work as in real time. In the current study a case of a residential building has been taken in Indore and a comparison has been done to see how much does it cost to get a schedule of quantity using conventional method and using BIM model with respect to the time duration in which the scheduling has been done. This will give us a clear picture of modern-day technology verses traditional way of performing jobs.**

Index Terms **- BIM, AEC, TIME OVERRUN, 2D, 3D, 4D**

I.INTRODUCTION

Building Information Modeling (BIM) is an arising innovation all through the world in the Architecture, Engineering, and Construction (AEC) businesses. BIM innovation furnishes clients with exact and predictable structure information and data, obliges the capacities expected to show the structure and gives a virtual perspective on the structure model. Building Information models are additionally progressively utilized by assorted partners during the task lifecycle like Owners, Designers, Contractors and Engineers. As a vital part in the undertaking lifecycle, workers for hire assume a significant part in ensuring the venture will be followed through on schedule and inside the spending plan. This postulation will show how BIM innovation will profit workers for hire for timetable and cost controls during arranging period of their task. It starts with an overall presentation of BIM innovation and the distinctive ways it works contrasted and customary CAD (Computer Aided Design) strategy, and proceeds with assessment of BIM apparatuses. It then, at that point clarifies the employments of Scheduling and Cost Estimating in BIM separately and gives a contextual investigation to show how BIM can function for cost assessing and project planning with the accessible BIM model. In the last part, the theory will furnish spaces of expected improvement with BIM innovation in the predicted future.

II.AIM OF PROJECT & PAPER

The superb object is to see the viability of BIM application for Project booking and contrasting the time needed with complete a work in arranging stage

III.OBJECTIVE

The objective of this project and paper is

- To Study regular techniques for getting ready 2D/3D Drawing, Project Scheduling, Quantity Take-Off, and Cost Estimation.
- To Study BIM (Building Information Modeling) for Project Scheduling and Quantity Takeoff by planning a 3D model in Revit Autodesk for pragmatic issues.
- To Study the Benefits of BIM Applications for Project Scheduling and Quantity Takeoff and extra prerequisites assuming any, to be placed into the model to get more advantages as far as Project Scheduling and Quantity Take Off.

- To analyze the ordinary techniques and BIM Applications of Quantity Take-Off and Project Scheduling

IV.LITERATURE REVIEW

- Fredri K et. al gives a detail clarification and conceivable outcomes of utilizing BIM in development arranging and its advantages to the top partner organizations in the development business.
- Juan et. al referenced Using Building Information Modeling (BIM) for Estimating and Scheduling, its issues on the move from regular technique to BIM, and the quality it brings to the general undertakings.
- Dalu Zhang presented a postulation on the BIM and the use of 4D to get an additional boundary in checking the general tasks.
- Kang et al. proposed an online 4D CAD to upgrade the coordinated effort during development booking measures. It specifies the utilization of normal information climate (CDE) which permits engineers, workers for hire, designers, and customers to connect with one another on a similar BIM model paying little mind to an environment where every one of the invested individuals is actually present.
- Jongeling and Olofsson clarified the work process with consolidated utilization of area-based planning and 4D CAD." They additionally proposed that an area-based booking could work on the ease of use of 4D models and 4D models could improve the worth of area-based timetables.
- Kang et al. proposed a web-based 4D CAD to enhance the collaboration during construction scheduling process. It mentions the application of common data environment (CDE) which allows engineers, contractors, architects and clients to interact with each other on the same BIM model regardless of time and place where all the interested parties are physically present.
- Jongeling introduced that the utilization of 4D is a promising way to deal with extricate various sorts of quantitative data from 4D models for time-space investigations of development tasks. The paper additionally told the best way to separate various sorts of 4D substances from 4D models for project arranging reasons.
- Young et al. conveyed overviews of thousands of AEC members like Architects, Engineers, Construction Managers, and so on in the U.S to assess the market worth of BIM innovation. The report showed that practically half of the business is presently utilizing BIM and a few clients as of now experienced worth from 4D planning of BIM, which was likewise one of the fundamental future improvement regions in BIM

V.PROBLEM STATEMENT

As of now there is a significant spotlight on the utilization of BIM. As organizations begin to carry out BIM, it appears to be a characteristic advance to zero in on 3D-plan at first and adventure direct benefits like plan coordination and conflict recognition. A single chance to get further benefits from BIM is to utilize it for planning purposes. However, what difficulties are organizations confronting while executing BIM-based booking? Moving towards BIM-based booking of development infers a critical cycle of progress that will incorporate various mechanical, authoritative just as different difficulties for all gatherings of concern. A change cycle of this extent requires an obviously defined vision, procedure and conveyed objective other than an arrangement and familiarity with the requirement for change. Consciousness of the requirement for change has its beginning stage in the current circumstance. Subsequently, a strong comprehension of the current circumstance of planning in development, its upsides and downsides, is important to examine expected impacts on the association with the presentation of BIM-based booking.

VI.METHODOLOGY

- An extensive research on previous work on application of BIM
- A brief discussion on BIM with explanation on 4D and 5D
- Select a sample structure for the study and obtain create its drawing.
- Take of the quantities of elements from those drawings and record the time invested.
- Create the model of structure in Revit.

- Record the time invested to create the model
- Create a quantity takeoff instance in Revit to know the quantities.
- Compare the time and cost of the project during this planning phase.

VII.BIM MODELLING FROM 3D TO 4D

The utilization of the term 4D is planned to allude to the fourth measurement; time, i.e.4D is 3D+Schedule (time). The job of 4D BIM is to add another measurement to 3D CAD Drawings or Solid demonstrating.

To make a proactive administration, it is significant for project groups to picture the development interaction in four measurements. Making this connection among existence is one of the dreams with BIM and alluded to as the fourth component of CAD. The primary thought is to associate exercises in the time intend to objects in the 3D model empowering visual reproductions of the structure cycle by stowing away and uncovering objects in a successive request. The imagined 4D models can assist directors with settling on choices about various strategy options, and since each article can be coded with data like size, material, required labor force and hardware, they can be utilized to make time arrangements, material conveyance plans, buying plans, and so on In large ventures with numerous entertainers it can likewise be feasible to associate various models and streamline creation along with different partners.

VIII. BIM MODELLING FROM 3D (MODELLING) TO 4D (PROJECT TIMING)

The utilization of the term 4D is proposed to allude to the FOURTH measurement; TIME, i.e. 4D is 3D+TIME (Quantity Take Off).

The significant advantage of this framework is to exercise distinctive plan alternatives those can measure up and afterward go about as a supporting base for dynamic. Moreover, when associated with time angles the model can work with cost control continuously, offering administrators the chance to screen cost improvements during projects.

IX. SOFTWARE USED

The software used to carry out this BIM execution project are as follows: -

- Autodesk Revit
- AutoCad
- MS excel

X. SAMPLE CASE STUDY

A sample 2D building was drafted in AutoCad -2019 student version and a BIM 3D model was created in Autodesk Revit student version

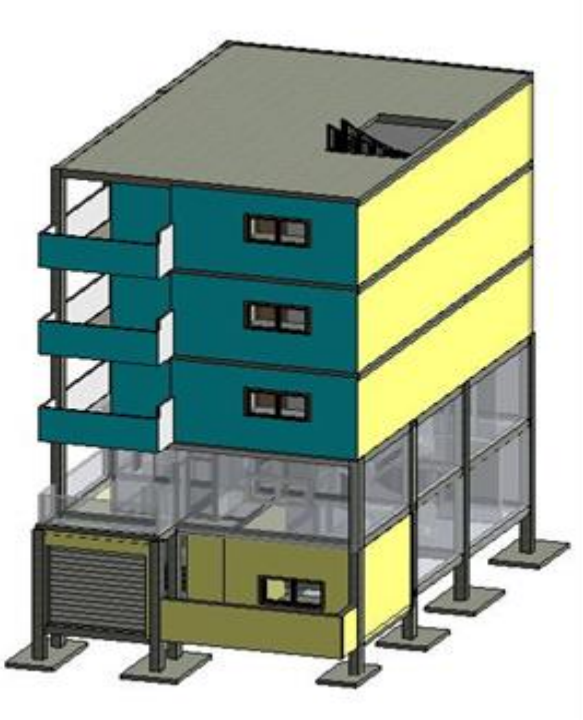


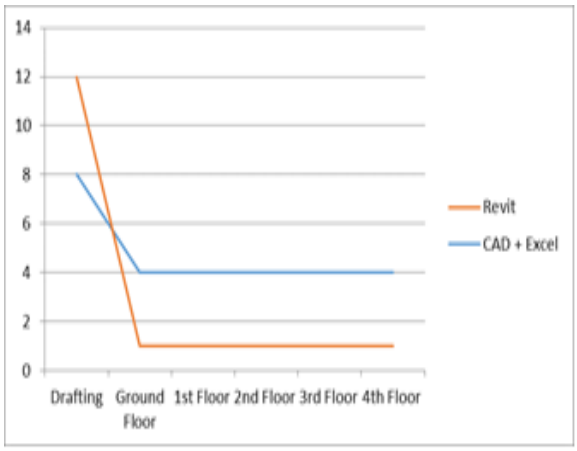
Fig -1: Sample building

XI.RESULT

From asking various experts in Indore we came to a conclusion of the amount of Time required to complete the given project is as follows:

Time to Draft in CAD	8 hrs
Time for quantity takeoff for G+4 floor	(4 hrs/ floor * 5 storey) = 20
Total time required	28 hrs
Time to model in Revit	12 hrs
Time for quantity takeoff per floor	(1 hrs/ floor * 5 storey) = 5
Total time required	17 hrs

Table 1: Man hours required to complete the sample project



Graph 1 – Time required for to draw in software

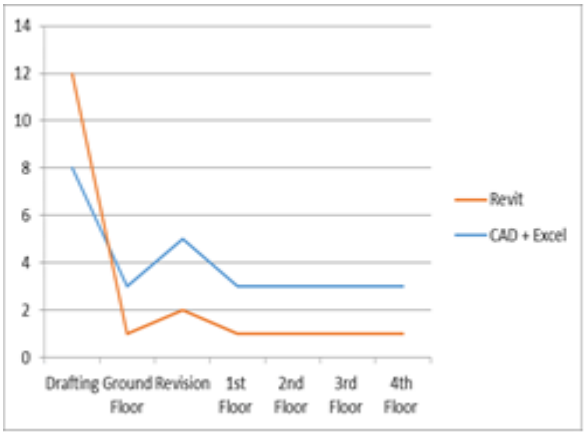
Time taken for	Software	
	AutoCAD + Excel (in hrs)	Revit (in hrs)
Drafting	8	12
Up to Ground Floor	3	1
Up to 1st Floor	3	1
Up to 2nd Floor	3	1
Up to 3rd Floor	3	1
Up to 4th Floor	3	1
Total	23 hours	17 hours

Table 2: Total Man hours required to complete the whole project

Time Saved = (AutoCAD time) – (Revit Time)
= (23 – 17) hrs
= 6 hrs

% time saved using revit after revision= 6/23 hrs
% time saved using revit after revision = 26.08 %

As there was an amendment in drawing from 1st floor, revision of time is shown in the table and graph below.



Graph 2 – Comparison of Time required for to draw in different software

Time taken for	Software	
	AutoCAD and Excel (in hrs)	Revit (in hrs)
Drafting	8	12
Up to Ground Floor	3	1
Revision 1 (Drafting)	5	2
Up to 1st Floor	3	1
Up to 2nd Floor	3	1
Up to 3rd Floor	3	1
Up to 4th Floor	3	1
Total	28 hrs	19 hrs

Table 3: Total Man hours required for different software

Revised Time Saved = (AutoCAD Time) – (Revit Time)
= (28-19) hours
= 9 hours

% time saved using revit after revision= 9/28 hrs
% time saved using revit after revision = 32.14 %

XII.CONCLUSIONS

As we can see from our expense investigation that BIM model not just saves our time in arranging period of the undertaking however it likewise is financially savvy. This could exceptionally impact different elements in huge ventures like postpone which can lessen the invade cost. As we can see from our examination, we can save time on project in arranging stage utilizing Revit over autocad by about 32.14%.

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