

A Statistical Analysis of Building Information Modeling in Project Management

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Abstract – Building Information Modeling (BIM) is turning into an extensive collective process in the development business. Notwithstanding its short history, BIM has had an expanding development amid the most recent decade. This is going on for the most part because of its capacities on development ventures. BIM can make a typical dialect between all gatherings and framework divisions in a venture and make them a coordinated group. The approach of BIM firmly coordinates with incorporated venture conveyance frameworks. The part of BIM as an organizer of venture framework is very like the obligations of a venture chief. BIM coordinates distinctive teaches by successful correspondence, examines the venture frameworks for constructability, evaluates the cost and time of tasks whenever utilizing amount departures, draws a major picture of undertaking utilizing perception and manufactures cooperative groups. All these are what a venture director does in an alternate scale amid a venture life cycle. This paper means to demonstrate the correspondence of BIM and venture chiefs' parts on development ventures. It underlines the significance of having legitimate BIM learning and experience for extend directors to succeed. This paper additionally talks about the prerequisites of BIM information and experience advancement of venture directors.

a dependable reason for choices amid its lifecycle from origin ahead."

The idea of BIM hypothetically rose and was created at Georgia Institute of Technology in the late 1970s and developed quickly after that. The development happened on account of the expanding consideration paid to development groups and firms that discovered merits in utilizing BIM so as to incorporate the procedure of the development extends and overseeing .The term Building Information Modeling was first utilized as a part of 2002 to portray virtual plan, development and offices administration (Harris, 2010).

Graphi delicate in 1986 presented its new programming as an answer for virtual building. This product, Archi scoundrel, was truly an extraordinary change in CAD projects of that time since REVIT permitted the making of three dimensional (3D) models of tasks (Dey, 2010). The terms Building Information Modeling and Building Information Model and the acronym of BIM were far reaching when Autodesk discharged the "Building Information Modeling" (Autodesk, 2003).

Key Words: Building Information Modelling, Project Management, Construction

1.INTRODUCTION

Building Information Modeling (BIM) can be characterized as a solid, advanced, three dimensional, virtual portrayal of the venture to be worked for use in outline basic leadership, development booking and arranging, cost appraisals and support of development ventures (Words and Images, 2009).The BIM Handbook (2008) characterized BIM as a PC helped demonstrating innovation with the end goal of dealing with the data of a development extend concentrating on creation, correspondence and examination of building data models. The National Building Information Model Standard Project Committee characterized the BIM as following: "A BIM is a computerized portrayal of physical and utilitarian qualities of an office. In that capacity it fills in as a common learning asset for data about an office framing

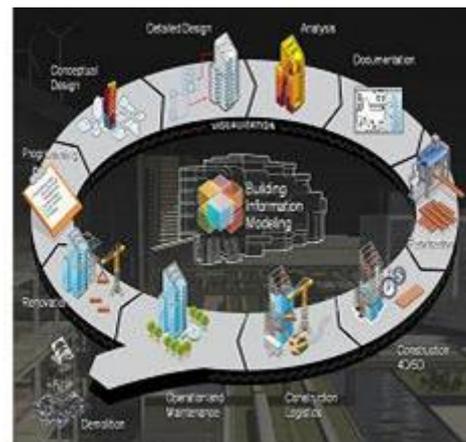


Fig. 1- Information img

Development ventures constitute the primary piece of all orders extends because of their sum, assortment and cost. The U.S. Statistics Bureau News (2013) evaluated that the development business would spend more than \$874 billion out of 2013. These ventures go from little private or retail activities to super multifunction ventures. Obviously, with

any size of a development extend, there is a need for overseeing it. The administration of development ventures requires information of current administration and a comprehension of all development forms. Alongside the adjustment in innovation, hierarchical game plan or methodology and new elements and techniques, the administration of development ventures contrasts (Hendrickson, 2000). Development extend administration is a progression of exercises for deciding how, when and by whom the work, including all life cycle exercises, will be performed.

Like the Project Management Body of Knowledge (PMBOK) definitions, the development extend chief handles extend administration arranging, cost administration, time administration, quality administration, contract organization, security administration and hazard administration. The venture director is likewise accountable for correspondence between all partners on the venture including proprietor, planners, engineers, proficient team and regulatory staffs. By and large, development extend administration shares the normal and general qualities of general undertakings, subsequently, the standards and strategies required for general venture administration can be connected to this sort of activities

II. BUILDING INFORMATION MODELING ASPECTS Technical Aspects of BIM

BIM has some particular elements that can successfully be utilized as a part of venture administration. These components, which are progressively created, can be condensed as takes after (Lahdou and Zetterman, 2011)

- **Clash Detection**

One of the regular issues of various controls' anticipates a development extend is the geometrical outline irregularities. This issue happens when there is a cover between the plans of various controls.

Utilizing BIM, it is conceivable to unite the plans and distinguish the conflicts. Changing the stylish issues is another probability of this visual checking

- **Constructability**

Utilizing BIM, it would be workable for partners in a venture to survey and handle constructability issues and (if necessary) advance issues into RFIs. Furthermore, visual data can be given from a vantage point to demonstrate the issues. This visual data going with markup permits encourage examination for discovering arrangements and, along these lines, mitigates the dangers.

- **Analysis**

Helping the venture chiefs, creators and designers in improving basic leadership is another part of BIM. By connecting the building data models to proper devices, it is conceivable to investigate the vitality utilization of a development venture and after that discover better arrangements, for example, changing materials and introduction, mass and space, and so on. Besides, light, mechanical and acoustics examinations are additionally accessible to be performed by BIM.

Time and Cost Estimation (4D and 5D)

Time and cost estimation are different components of BIM which empower extend chiefs to imagine the development extend anytime and have a reasonable comprehension of venture stages. Time and cost estimation, which are for the most part called 4D and 5D, can be appropriately used in the main phases of a venture and encourage the basic leadership process with least cost and time required. Besides, BIM has the ability to mimic the different choices for a development extend and subsequently helps extend chiefs and administrators to dependably foresee the results of their choices.

- **Integration**

The venture group can bargain and connect with a brought together model when a composite model is worked from an amalgam of different orders' models. Having this capacity, and through the distinctive periods of a development extend, BIM can facilitate the plan, investigation, and development exercises on a venture and, subsequently, brings about honesty of undertakings.

- **Quantity Take-off**

Amount departures in a BIM model can be extremely useful for the venture groups and chiefs to dissect their choice and have an unmistakable and dependable knowledge to different choices in the plan stage or even all through the venture lifecycle. Since there is a plausibility of reconciliation between the BIM show and a database

III. ROLE OF BIM IN PROJECT MANAGEMENT 3-1. BIM versus PMBOK Knowledge Areas

Abilities of BIM on development ventures compare to the PMBOK information regions, since the nature and part of everything are indistinguishable. Along these lines, BIM can be considered as a viable and effective device in extend administration in the development business.

Coordination administration is the primary range of PMBOK, which has an indistinguishable capacity from the BIM. BIM coordinates the reports, plans and endeavours of all gatherings required on a venture. BIM is additionally a

question based condition that can sort diverse components of a building and separate it into various gatherings, similar to what happens in extend scope administration. Another normal for BIM is its capacity in overseeing time and cost or what is supposedly called 4D and 5D. This is like venture cost and time administration regions in PMBOK standard. In spite of the fact that the constructability does not show all dangers related with a development extend, it is an intense instrument in building a venture and mitigates the development dangers. Conflict discovery in BIM goes about as a quality procedure which outwardly perceives, adjusts and breaks down the delicate and hard conflicts. Cooperation and group working in BIM is the thing that human asset administration considers as a venture administration range. Correspondence is a principle highlight of BIM which encourage the expert connection between all gatherings including venture chiefs, fashioners and specialists on a development extend by making compelling and coordinate correspondence channels. At long last, acquisition administration would be conceivable by amount departures which are created by BIM. What's more, changes in any thing can be effectively reflected in taken a toll and time and work required for its acquisition. Despite the broad system of venture administration, BIM can be exhibited as a fundamental and compelling idea relating to extend administration information ranges. Figure 2 demonstrates model of PBOK information ranges considering BIM on development ventures.

3-2. BIM Benefits and Advantages

Distinctive wellsprings of development extend administration distinguish key focal points of utilizing BIM as takes after (Qian, 2012):

- "Enhanced extend coordinated effort and control among partners
- Improved profitability (less re-work, clashes and changes)
- Better extend quality and execution
- Faster extend conveyance
- Reduced wastages
- Reduced construction costs
- New revenue and business opportunities"

BIM Tools available for construction practice

There are plenty of Building Information Modelling tools. This subsection will identify these products. The following table, figure 8, depicts the BIM authoring tools and their primary functions. The list includes MEP, structural, architectural, and site work 3D modelling softwares. Some of these softwares are also capable of scheduling and cost estimation.

CASE STUDTIES

Venture name: Casa Magayon
Sort: Residential
Area: Guanacaste, Costa Rica
Year: 2015

Estimate: 13,900 ft²
Programming utilized: REVIT
Casa Magayon is situated in the Península Papagayo

Resort, Guanacaste, Costa Rica, with a development zone of 1,290m². The living arrangement is a tropical translation of the exemplary "Glass House" by Philip Johnson. Essentially, the outline was organized separately, in light of autonomous shapes with expansive, floor-to-roof coated surfaces, and associated with each other by spans that frame outdoors ways, permitting consistent contact with the earth. This methodology was additionally utilized as a reasonable component, since it lessens the measure of cooling, and enables it to work separately, expending vitality just in the spaces being utilized. The venture is an extravagance living arrangement for get-away and to lease when the proprietor is not there. The living arrangement limits vitality utilization contrasted with numerous different cases inside the resort, without trading off on extravagance and wrapping up.



Fig 2-plan



Fig 3-Rivet MEP model

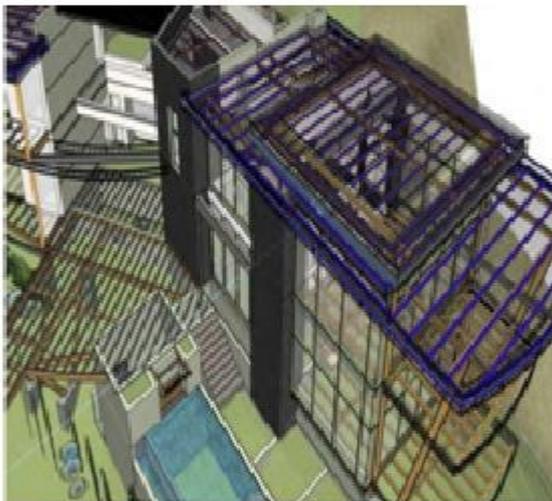


Fig 3-Structural model



Fig 4- Rivet Model



Fig 5-Actual Construction

Casa Magayon demonstrated in REVIT

Casa Magayon was demonstrated completely utilizing REVIT, from its underlying idea; the whole 2D documentation process was produced from the "live" REVIT show, with definitely no substance attracted 2D. Amid the procedure, MEP was additionally consolidated to display the aerating and cooling and tempest channels to affirm that there were no impacts. All the inherent furniture is demonstrated totally in REVIT, with the help of the Cadimage Cabinets instrument. Cooperation was consolidated all through its improvement procedure, and BIMx was utilized as a basic specialized device with the customer amid the development procedure and on location.

3. CONCLUSIONS

This papers considers viability of building data demonstrating for successful venture administration and to diminish cost invades. The accompanying conclusion can be drawn after polls study and contextual investigations

- The extend contemplated six BIM usage exercises: representation, 3D coordination, cost estimation, construction, development arranging and checking, and record show. The perception is by and large the most straightforward utilization of a Building Information Model, for example, renderings

- As soon as the Building Information Model are created, the amount departures can be produced to give cost estimations on a development extend. Besides, the 3D coordination was used to distinguish and dispense with exchange

Fig.6 REVIT PLAN model clashes and clashes. Notwithstanding that, nitty gritty construction drawings can be produced to audit and facilitate work between exchanges.

- Once the drawings are designed to build, the construction of the parts of the development office can be worked to plan. BIM based 4D planning

REFERENCES

- [1] D Ning, X., Lam, K., and Lam, M., A decisionmaking system for construction site layout planning, *Automation in Construction*, 20, 459-473, 2011.
- [2] Pradhananga, N. Teizer, J., Congestion Analysis for Construction Site Layout Planning using Real-time Data and Cell-based Simulation Model, *Computing in Civil and Building Engineering*, 681-688, 2014.
- [3] Yahya, M. and Saka, M., Construction site layout planning using multi-objective artificial bee colony algorithm with Levy flights, *Automation in Construction*, 38, 14-29, 2014.
- [4] Andayesh, M. and Sadeghpour, F., The time dimension in site layout planning, *Automation in Construction*, 44, 129-139, 2014.
- [5] Astour, H. and Franz, V., BIM-and Simulation based Site Layout Planning, *Computing in Civil and Building Engineering*, 291-298, 2014.
- [6] Cheng, J. and Kumar, S., A BIM Based Construction Site Layout Planning Framework Considering Actual Travel Paths, *The 31st International Symposium on Automation and Robotics in Construction and Mining*, 2014.
- [7] Olearczyk, J., Lei, Z., Ofrim, B., Han, S., and Al-Hussein M., Intelligent Crane Management Algorithm for Construction Operation (iCrane), *The 32nd International Symposium on Automation and Robotics in Construction and Mining*, 2015.
- [8] Hollermann, S. and Bargstädt, H., 4D Site Installation Planning in Virtual Reality for Multiuser, *Computing in Civil and Building Engineering*, 777-784, 2014.
- [9] Eastman, C., Lee, J., Jeong, Y., and Lee, J., Automatic rule-based checking of building designs, *Automation in Construction*, 18, 1011-1033, 2009.
- [10] Solibri Model Checker, On-line: <http://www.solibri.com/products/solibri-modelchecker/>, Accessed: 11/08/2015.
- [11] Kim, K. and Teizer, J., Automatic design and planning of scaffolding systems using building information modeling, *Advanced Engineering Informatics*, 28, 66-80, 2014.
- [12] Zhang, S., Sulankivi, K., Kiviniemi, M., Romo, I., Eastman, C., and Teizer, J., BIM-based fall hazard identification and prevention in construction safety planning, *Safety Science*, 72, 31-45, 2015.
- [13] Autodesk Revit, On-line: <http://www.autodesk.com/products/revitfamily/overview>, Accessed: 12/06/2015.

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