



BIM Implementation in Mall Laves Project Construction Surabaya

Moh Sofyan Arif, Ronny Durrotun Nasihien, Hendro Sutowijoyo

Department of Civil Engineering, Faculty of Engineering, Narotama University, Indonesia

*Corresponding author e-mail: sofyan.arif1001@gmail.com

Manuscript received 23 Feb 2021; revised 2 March, 2021; accepted 15 March 2021. Date of publication 2 April 2021

Abstract

Nowadays, The development of Building Information Modeling (BIM) in Indonesia is very limited, even though the existence of Building Information Modeling (BIM) is very helpful in the Indonesian construction building projects. Mall Laves Surabaya project using several Building Information Modeling (BIM) based software in terms of project management planning. There are Autodesk Revit, Cubicost Glodon, and Autodesk Naviswork software. The purpose of this research is to implementation Building Information Modeling (BIM) in Indonesian project development. The results are 3-dimensional modeling, volume calculations based on 3 dimensions, and project schedule simulations to provide detailed visual information.

Keywords: BIM, Autodesk Revit, Cubicost Glodon, Autodesk Naviswork.

1. Introduction

Nowadays, The development of Building Information Modeling (BIM) in Indonesia is very limited, even though the existence of Building Information Modeling (BIM) is very helpful in the Indonesian construction building projects [1]. Building Information Modeling (BIM) is a process and revolutionary technology that is rapidly changing the way to understands buildings, design, construction, and operation [2]. In the construction of building projects, the things that must be considered are, arranging budget plan, preparing a work schedule, controlling and supervising. Therefore in this research, the author will use the Autodesk Revit program.

Using *Building Information Modeling* (BIM) will connect design process, procurement, and construction. BIM can help AEC (*Architectural, Engineering, Construction*) to improve accuracy, efficiency and productivity [3]. It can make project on time and cost savings. BIM makes project approval faster, more predictable results, sustainable design, analytical services, increased collaboration and information sharing for integrated project achievement strategies [4] [5].

2. Method

This research was carried out by collecting primary data which consisted of research locations and project photos, other than that secondary data consisting of Drawings For Construction and Schedule Microsoft Project from the Mall Laves Surabaya construction project by PT PP (Persero), Tbk. Then, the data is processed into 3D modelling, calculation of work volume based on 3D modelling, and visual simulation of project work implementation using some Building Information Modeling (BIM) software. The following is a flowchart of research methodology [6] [7]:



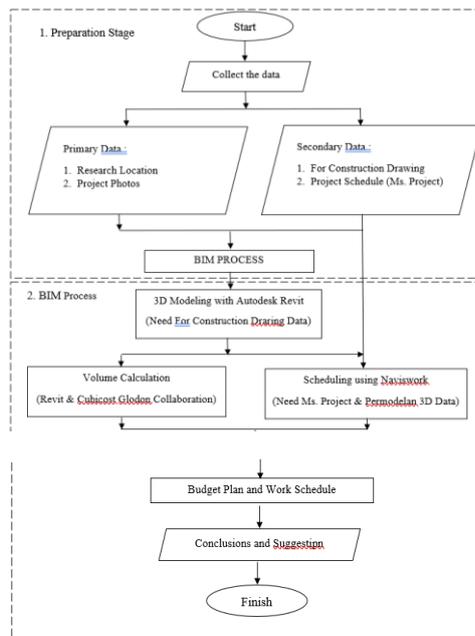


Fig 1. Methodology

3. Results and Discussion

Corresponding to the background of this research, where the comparison of work efficiency between the conventional method with the BIM concept in the time, HR and budget plan, results that using applications with the BIM concept can accelerate project planning time is +50%, BIM reduces the need HR is 26.66% and saves personnel expenses is 52.25% compared to conventional applications⁽³⁾. So in this research, the author will make the implementation of Building Information Modeling in the construction of the Laves Mall Project in Surabaya.

3.1.3D Modelling

3D modeling begins with creating a new project in Autodesk Revit, then setting the project name, elevation level, importing autoCAD files to make it easier to create grids. After it has been set, then proceed by drawing one by one the building components starting from bottom structure such as pile cap, tie beam, and retaining wall to the upper structure such as columns, beams, and plates.

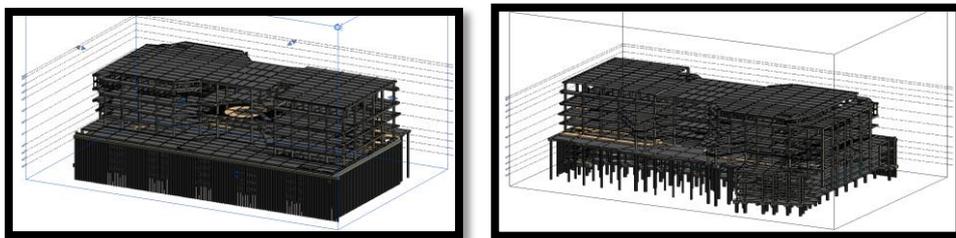


Fig 2. 3D modelling result

3.2. Calculation based on 3D modelling

After doing a 3D modelling with Autodesk Revit software, the next step is calculate job volume. BIM software that used to calculate concrete and formwork is Cubicost Glodon TAS and Software Glodon TRB to calculate steel volume. All project component must be calculate and the result are :

- Concrete = 10.280,83 m³,
- Formwork = 27.331,66 m²,
- Steel = 1.805.900,32 kg.

Then, making a budget plant with multiplying volume with unit. So that, hereby the results of a Mall Laves structure budget plan :

Table 1. Budget Plan of Mall Laves Project

Number	Information	Unit	Volume	Unit Price	Total
1	Concrete	m ³	10.280,83	849.300	8.731.513.776
2	Formwork	m ²	27.331,66	164.800	4.504.257.843
3	Steel	kg	1.805.900,32	11.200	20.226.083.638
TOTAL					33.461.855.256

3.3. Schedule Simulation of 3D Modelling

After we have project 3D modelling and job volume, the next step is scheduling. This research needs to input a Microsoft Project file and 3D modelling to Naviswork. Collaboration between Microsoft project and 3 D modelling in naviswork will produce an animation that describe project step by step simulation corresponding project schedule.

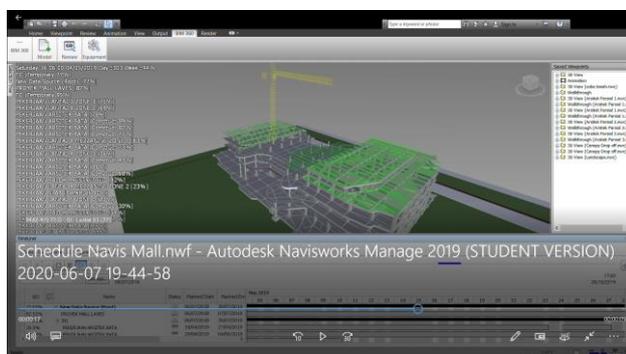


Fig 3. Simulation Schedule 3-dimensional modeling (1)

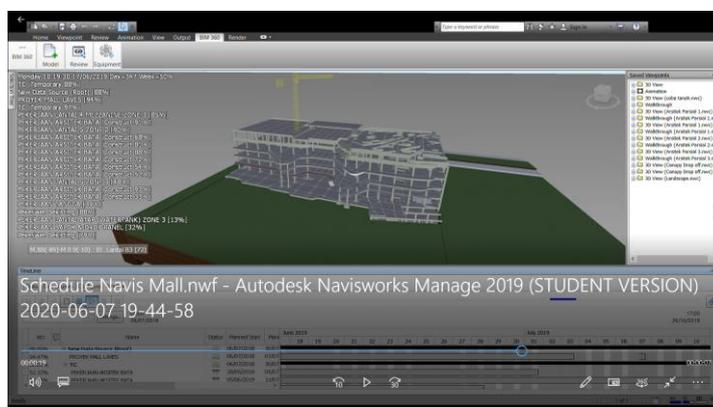


Fig 4. Simulation Schedule 3-dimensional modeling (2)

4. Conclusion

Structure 3D modelling which refers to shopdrawing on Autodesk Revit software is very helpful in the project working details. It is provide information called clash detection between floor to floor in structure work. Beside that, it have a high level of accuracy detail. Collaboration among Building Information Modeling software (Autodesk Revit, Cubicost Glodon, and Autodesk Naviswork) are an implementation which are interconnected with one another in the project implementation management planning.

References

- [1] K. M. Kensek, *Building information modeling*. 2014.
- [2] R. Miettinen and S. Paavola, "Beyond the BIM utopia: Approaches to the development and implementation of building information modeling," *Autom. Constr.*, 2014, doi: 10.1016/j.autcon.2014.03.009.
- [3] S. Azhar, M. Khalfan, and T. Maqsood, "Building information modeling (BIM): Now and beyond," *Australas. J. Constr. Econ. Build.*, 2012, doi: 10.5130/ajceb.v12i4.3032.
- [4] P. Bynum, R. R. A. Issa, and S. Olbina, "Building Information Modeling in Support of Sustainable Design and Construction," *J. Constr. Eng. Manag.*, 2013, doi: 10.1061/(asce)co.1943-7862.0000560.
- [5] J. Steel, R. Drogemuller, and B. Toth, "Model interoperability in building information modelling," *Softw. Syst. Model.*, 2012, doi: 10.1007/s10270-010-0178-4.
- [6] B. Becerik-Gerber and S. Rice, "The perceived value of building information modeling in the U.S. building industry," *Electron. J. Inf. Technol. Constr.*, 2010.
- [7] K. P. Reddy, "Introduction to Building Information Modeling," in *BIM for Building Owners and Developers*, 2019.