

# Quality Control System in the Implementation of High-Rise Building Construction Projects

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System supervision quality project construction is the part that focuses on the process of directing, controlling, in implementation achievement results related construction with target quality project construction. System management quality which is quality plan with identification quality project required construction. So that implementation project construction in documentation during implementation ongoing projects ongoing with objective for reach quality construction as required. Supervision quality construction done to produce appropriate construction required quality in plan construction. In order to fulfill hope owner and maintain quality construction in the field project construction, so that the results obtained in accordance with plan. Implementation efforts project construction in frame for get standard quality from provider services. Parties contractor must can carry out quality in accordance with quality plan, so that results quality in accordance with condition plans and sni. The purpose of study this is for know supervision quality construction in building construction in a way general and specific development uin maulana malik ibrahim malang building. Research this done with method interviews, observations, and the use of bim (building information modeling).

**Keywords:** supervision, construction quality, building information modeling

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## 1. Introduction

Project development implementation construction in indonesia is things that always connected with quality required construction. Implementation project construction must in accordance with standard applied quality in applicable sni regulations. So that quality applied construction is quality construction in accordance with plans and requirements in sni standards. Target implementation project construction is management project with condition specified quality. Relationship this is connection between equipment, materials, and methods suitable work with condition quality construction. So that the project process ongoing construction is suitability of 3 components in order to fulfill condition quality construction. This is done with hope project construction that was built in accordance with plan and finish in accordance with specified time as well as can operationalized in a way maximum construction quality is things to do maintained in accordance with plans and patterns and the development process customized with stages during implementation. For that effectiveness system supervision quality construction in the implementation process can maximize moment implementation and control project during construction the ongoing. Construction quality in achieve the targets and conditions specified in order to obtain results quality construction in accordance with plans that have been approved. Improvement quality construction this done in all service construction and quality construction in accordance with required plans and sni.study this with limitation on: observations on some work structure the development of uin maulana malik ibrahim malang. The aim of study this is for know system supervision management quality in some jobs structure, including in work foundation, column, beam, floor slab for 1st and 2nd floors.

## 2. Literature review and problem statement

### Quality

Development in field construction is step strategic in increase quality development in indonesia. In the research together students on the project construction of uin maulana malik ibrahim malang as one of the college the leading islamic high school in indonesia frame expand facilities and infrastructure in order to fulfill needs. Project this aim for present facility education integrated and representative height with approach planning sustainable (sustainable design). Quality is the term that always at work construction, so that quality become very important and must thing filled in accordance plan. In order to maintain and implement quality quality from good construction, then need existence efficiency and effectiveness in implementation quality construction. (ministry of public works and public housing, 2020).

### System quality management

System management quality is quality of implementation something construction in carry out work, so that in detail quality work including:

- a. Details available engineering design in a way complete.
- b. Implementation work in accordance with system management planned quality.
- c. Management appropriate quality, will get results maximum performance.
- d. Specification technique in accordance with plan.

So that system management quality is something method in direct implementation work construction in accordance with stages planned plans and goals. (hafnidar, rani, 2016)

### Implementation quality management

Understanding management quality in service construction in principle is achievement suitability between results work submitted by the provider service contractors and desires owner or owner project. Factors that become material consideration for guard quality construction in project construction is: lack of mastery power experts, the quality of the material is not well, wrong estimate or not enough right, less appropriate in management project time implementation. Some among which causes quality construction no in accordance plan is: not enough work experience no in accordance procedures, materials and equipment that are not adequate (sari, 2011).

### Bim (building information modelling)

Building Information Modeling (BIM) is a digital representation of the physical and functional characteristics of a building, so that it contains all information about the elements in the building, then used as a basis for decision making during the time or life cycle of the building from design to demolition. The use of BIM must be applied to buildings in non-simple countries, with criteria of area > 2000 m<sup>2</sup> and on 2 (two) floors.

Benefits of use building information modeling (bim) between other:

- a. 3d based object modeling parametric.
- b. 4d which is sequence and scheduling of materials, workers, area size, time, etc.
- c. 6d which takes into account for facility management, cost, cycle life, and impact environment

So that profit use building information modeling (bim) in project construction between other:

- a. More communication easy and clear.
- b. Information plan budget costs, volume of materials required and estimates cost more fast and accurate.
- c. Facilitate data sharing

- d. Building can be analyzed more beginning.
- e. System coordination and collaboration between party
- f. Produce friendly building environmental and economical energy

With thus building information modeling (bim) can implemented for various stages project, scope jobs, and resources power needed for each construction stages building. (pupr ministerial regulation no. 22, 2018).

### 3. Method

Research conducted together students on the uin maulana malik ibrahim malang development project, located in malang. The research this done for 2 months start from preparation, field survey, data, until with results analysis on quality construction structure foundation, beam, column, floor slab for floors 1 and 2 and use bim (building information modeling). The following is a flow chart in compilation study this.

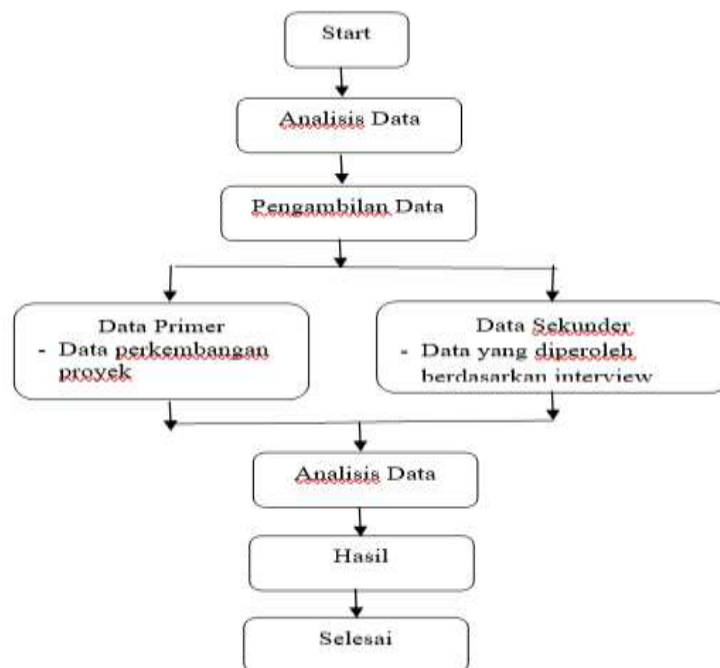
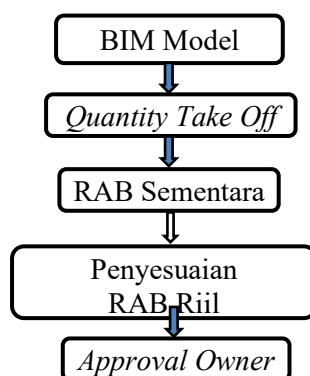


Figure 1. Research flow diagram

### 4. Results and discussion

#### Bim (building information modeling)

Use bim software provides lots benefit in matter for efficiency quality, time, and cost. With bim it is possible existence detection collision (clash detection) before stage construction done). With using bim in modeling structure lower (foundation) of the building in accordance with type data size and conditions. With using bim which is tool communication cross discipline for covers all element work, even though in practice there is a number of constraints. Construction quality for work structure in study this done with comparison 5d bim estimation with realization budget. With using flowcharts use of bim as below this:



**Figure 2** flow of theory vs practice of cost estimation

(source: kurniawan & firmansyah, 2021)

As for the results quality construction on the development of uin maulana malik ibrahim malang was obtained with results following:

**Table 1.** Use of bim

No	Job components	Bim estimation (rp)	Field realization (rp)	Deviation (%)
1	Concrete structure	3,500,000,000	3,725,000,000	+ 6.43%
2	Structural steel	1,200,000,000	1,100,000,000	- 8.33%
	Total	4,700,000,000	4,825,000,000	+ 2.66%

(source: Eastman et al., 2011)

From the results that can be obtained that with use quality plan, next specification the implemented with tool help or bim software then, shows existence deviation good that deviation negative and positive. With use calculation material quantity and estimation cost in a way automatic minimize error quantity and speed up the estimation process.for synchronize a number of component building between element structure, architecture, and mechanics electrical plumbing still consider activities work in timeline. So that results this 4d job will display order work in accordance time visually and animatedly. The results of this 4d simulation allow team project can do:

- a. Identify potential conflict time between work
- b. Evaluate effectiveness order activity
- c. Doing validation to eligibility timetable
- d. Giving visualization to owner and parties management

Construction quality in work structure if compared to with 4d simulation timeline with performance work will seen in table following:

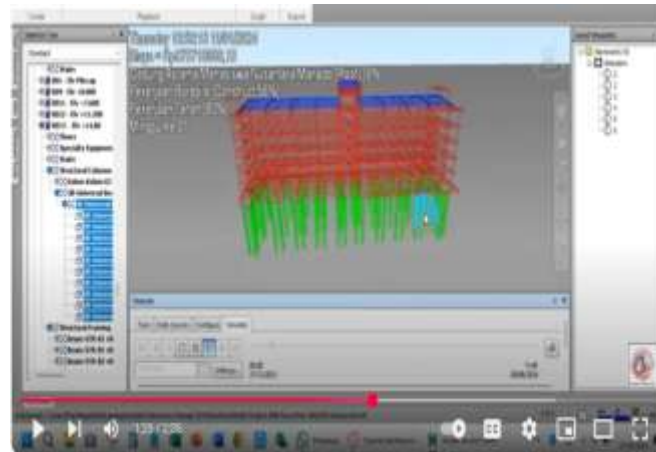
**Table 2.** Use of bim

No	Work items	Duration (days)	Implementation (day)	Deviation (± day)	Information
1	Foundation work	21	24	+ 3	Delayed because weather
2	Ground floor columns	14	14	0	On schedule
3	Floor beams and slabs 1	18	20	+ 2	Material delay
4	2nd floor column	12	12	0	On schedule

No	Work items	Duration (days)	Implementation (day)	Deviation (± day)	Information
5	Floor beams and slabs 2	20	19	- 1	Acceleration implementation

(sumber: eastman et al., 2011)

simulation description perspective use building information modelling for important time in consequence work. Each bim line represents a structural item and its relationship with time implementation as well as with quality used for get accurate value. Here is bim view.



**Figure 3.** 4D Schedule Simulation Results  
 Source: Project Data, 2025

With table mentioned above, then can known in a way details deviation time with still prioritize quality construction.

**Table 3** summary time deviation

No	Work items	Deviation (± day)
1	Work foundation	+ 3
2	Ground floor columns	0
3	Floor beams and slabs 1	+ 2
4	2nd floor column	0
5	Floor beams and slabs 2	- 1

(source: Eastman et al., 2011)

## 5. Conclusion

From research about supervision quality construction in implementation project construction so can concluded as following:

- The uin maulana malik ibrahim malang development project has apply building information modelling in a way comprehensive in every stages implementation work, with apply building information modelling in a way complexity, then good representation in see effectiveness building information modeling in the project.
- Construction quality on the job structure foundations, columns, beams and floor slabs for 1st floor, 2nd floor with supervision quality with software building information modeling can be obtained results effective and appropriate with plan. With implementation of bim then it can be obtained results as following: work structure concrete and structural steel with deviation by +2.66%.

c. With still prioritize quality construction, and implementing building information modeling, then can known, level efficiency cost and time in a way effective. With apply building information modelling proven is effective digital solutions in increase efficiency, accuracy, precise for project construction. With implementation building information modeling can be obtained deviation time as following

No	Work items	Deviation ( $\pm$ day)	Information
1	Work foundation	+ 3	Delayed because weather
2	Ground floor columns	0	On schedule
3	Floor beams and slabs 1	+ 2	Material delay
4	2nd floor column	0	On schedule
5	Floor beams and slabs 2	- 1	Acceleration implementation

d. Implementation building information modeling is very necessary in implementation project construction in a way general, because quality construction, time and cost can known more accurate compared to manual method

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