Problem Factors in Supervision and Checking of the Sample House and Fence Construction Project in Samera Djohor, Deli Serdang Regency

Muhammad Akbar Athallasyah[1*]
[1]PT. Samera Propertindo,
*Corresponding Author: Muhammad Akbar Athallasyah. Email: Muhmmadakbar011@gmail.com

Abstract
In construction projects on the field, during both the construction process and post-construction, various issues can often be encountered, one of which is the damage to concrete casting results. Casting issues in a multi-story building construction project are a challenge that must be addressed as they lead to poor casting results such as cracking, insufficient compressive strength, and insufficient tensile strength. This research is conducted with the aim of evaluating and providing solutions to prevent the recurrence of similar casting problems. The method used in this scientific paper is a quantitative research method conducted through literature review of journals and previous research. To address the problems encountered in casting, good planning related to scheduling and casting-related needs is necessary. Proper and adequate preparation for casting work will minimize undesired outcomes on the building's quality.
Keywords: building construction, casting, scheduling

1. INTRODUCTION

1.1. Background

In this modern era, there is a strong push from many individuals to design infrastructure that can provide broad benefits to society. One example is the construction of high-rise buildings, which are expected to positively contribute to the surrounding environment. Despite advances in technology, a number of challenges cannot be ignored during the construction process.

A construction project is a series of interrelated activities aimed at achieving a specific goal (building/construction) within specific time, cost, and quality constraints. Construction projects always require resources: people, materials, machines, methods, money, information, and time. In a construction project, three critical elements must be considered: time, cost, and quality (Kerzner, 2009). Project failure occurs when the results of the construction work do not meet the requirements agreed upon in the contract. This encompasses three elements of project management: time scheduling, cost expenditures, and quality standards (Febriantoro et al., 2022). Project delays can be caused by various factors, including: (1) problems with the contractor, such as late start times, inexperienced workers, equipment delays, inactive supervision, and poor work planning; (2) errors by the project owner, such as late payments, delayed materials, design changes, or the presence of other contractors on the project; (3) other factors, such as fire, war, earthquakes, floods, force majeure, and changes in the value of money (Putra, 2022).

Construction work is a high-risk profession. This is due to the sheer scale of the work, the need for strong cooperation with all parties involved in achieving a successful project, and the complexity of the work (Malik, 2010). Many factors can contribute to problems in construction projects. Generally, these problems stem from a lack of thoroughness in project planning, such as a lack of effective workflow management, and also from unintentional errors made by the workforce during the work. Examples of problems that frequently arise in construction projects include planning errors, inaccurate designs, inappropriate installation of reinforcing steel, and errors in the casting process.

The challenges that often arise in construction projects related to concrete casting are a focus for those responsible for the project. The concrete casting process requires a thorough understanding of material composition, implementation methods, and proper application techniques. Although sometimes considered a simple task, concrete casting requires specialized expertise; if carried out by unskilled

1.2. Formulation Of The Problem

Based on the preliminary study outlined above, the problem can be formulated as stemming from a lack of thoroughness in project planning, such as a lack of effective workflow management, and also from unintentional errors made by the workforce during work execution. Problems that frequently arise in construction projects include planning errors, inaccurate designs, inconsistencies in the installation of reinforcing steel, and errors in the casting process.

1.3. Research Purpose

A construction project is a series of interrelated activities aimed at achieving a goal (building/construction) within specific time, cost, and quality constraints. Construction projects always require resources, namely people, materials, machines, methods, money, information, and time. The purpose of this research is to calculate the time, cost, and quality of a construction project.

2. THEORITICAL REVIEW

2.1. Development Planning Approach

The approach used in the Planning of the Samera Djohor Model House and Fence in Deli Serdang Regency includes the following:

a) Planning is carried out in a broad manner, taking into account various interrelated aspects.
b) Each element in a planning subsystem is considered an integral part that forms an overall system or structure.
c) All aspects related to the implementation of the series of actions and their impact on the development process are also a primary focus.
d) The result of this approach is a comprehensive and rational plan, encompassing all aspects of development objectives in an integrated manner. Furthermore, this approach views the problem as a unified whole, both internally and in relation to external factors, namely other elements outside the system but still functionally related to the system.

2.2. Series Of Activity

A construction project is a series of interrelated activities to achieve a specific goal (building/construction) within specific time, cost, and quality constraints. Construction projects always require resources, namely people, materials, machines, methods, money, information, and time. In a construction project, there are three important considerations: time, cost, and quality.

Fig. 1. Research Methodology Flowchart

The next stage is data collection, the researcher uses a quantitative method through a Literature Review. A literature review is a description of theories, findings, and other research materials obtained from reference materials to serve as a basis for research activities. A literature review contains reviews, summaries, and the author's thoughts on several library sources (articles, books, slides, information from the internet, etc.) on the topic discussed (Hasibuan, 2007). In the research in this journal, the data used are references from related journal articles, as well as internship reports related to the construction project of the Samera Djohor Model House and Fence, Deli Serdang Regency.

3. RESULT AND DISCUSSION

During the construction of the Samera Djohor Model House and Fence Project in Deli Serdang Regency, several issues arose, involving structural, architectural, and MEP (mechanical, electrical, and plumbing) aspects. These included structural issues related to column verticality, beam work, and column casting, which hindered subsequent work.

3.1. Identifying Improvements

The causes of damage/defects in a project vary, depending on the structural work. The following is an identification of the causes of structural problems:

1. Column Verticality

Fig. 2. Kolom K1B as 1B2

Column K1B and axle 1B2 experienced bubbles and dimensional changes. The southern section of the column leaned to the left, appearing twisted. This was due to a lack of verticality checks after casting, resulting in the formwork not being adjusted under pressure. This resulted in the concrete hardening, resulting in bubbles and dimensional changes. This was also due to the formwork being unsuitable for use.

VERTICALITY COLUMN							
No	**Kolom & As**	**Support**	**Pijakan Support**	**Tie Rod**	**Sabuk**	**Unting-unting**	**Verticality**
1	K6 AS D-6	√	√	√	√	√	23; 23
							24; 24
2	K6 AS B2-6	√	√	√	√	√	25; 25
							21,5; 21,5
3	K5 AS B1-6	√	√	√	√	√	25; 25
							22; 22
4	K5 AS A-6	√	√	√	√	√	25; 25
							26; 26
5	K7 AS A-6	√	√	√	√	√	22; 22
							25; 24
6	K1 AS A-B2	√	√	√	√	√	22; 22
							20,5; 20,5
7	K2 AS D-5'	√	√	√	√	√	24; 24
							24,5; 24,5
8	K2 AS B2-5'	√	√	√	√	√	25; 25
							23; 23
9	K1B AS B2-1	√	√	√	√	√	21; 21
							25,5; 25,5

Fig. 3. Form Verticality

2. Beam Structural Work

A beam structure is a structural element that receives forces acting transversely to its axis, resulting in bending moments and shear forces along its span. Beams are structural elements that transfer loads from floor slabs to columns as vertical supports. Beam structural work often experiences segregation and porosity, resulting in visible reinforcement. This occurs due to prolonged use of a concrete vibrator at a specific point.

Fig. 4. Segregation and Porous Beams

3. Casting Work

Currently, ready-mix concrete is widely used for casting work, and the equipment required to support this activity is a concrete pump truck, which functions to transport the concrete to the casting area. Problems with the casting work include obstacles due to incorrectly ordered concrete pump types. Due to the difficult- to-reach casting location, column casting was delayed, resulting in beam and slab work progressing to reinforcement work. During casting, obstacles occurred because the concrete vibrator had difficulty entering the columns due to the slab and beam reinforcemen.

Fig. 5. Concrete Pump

Job Solutions

1. Column Verticality

The solution for columns experiencing bubbles is to first chip or drill the column until the reinforcement is visible. Next, clean the area thoroughly. Then, patch the column with a mixture consisting of floor hardener and WP bitumen liquid. Cure the area.

Fig. 6. Column Repair

2. Beam Structural Work

The solution to the segregation problem that occurs in beams is grouting, the process of filling the gaps or spaces between structural elements with a liquid mixture, usually called grout. Grouting can be made from a mixture of cement, sand, and water, or certain chemicals, depending on the needs. The first stage of grouting is as follows:

a) Surface chipping
Beams experiencing segregation are cleaned or crushed until the unsegregated part of the beam is reached.

b) Material selection
The selection of grouting materials must be appropriate. Grouting materials consist of floor hardener and liquid WP bitumen.

Fig. 7. Grouting Materials

c) Prepare the grounding mixture.
After selecting the appropriate ingredients, mix them according to the instructions to achieve optimal results.

Fig. 8. Mixing Mixture

d) Apply grouting
After mixing the ingredients, it can be directly applied to the concrete blocks that have experienced segregation. If it is not applied immediately, the mixture of ingredients will harden. Before applying the blocks, WP bitumen liquid is applied first.

Fig. 9. Apply Grouting

3. Concrete Work

Fig. 10. Casting Using a Concrete Pump

To prevent problems with casting work from recurring, the first step is to estimate the distance between the casting location and the concrete pump to determine whether the concrete pump pipe reaches the casting location.

If the concrete vibrator is difficult to penetrate, the worker can loosen the iron slightly to create a gap for the vibrator to enter. If the vibrator cannot reach the base of the column, use a wall vibrator to ensure a more even concrete mix.

4. CONCLUSIONS AND SUGGESTIONS

4.1. Conclusion

Based on the problems with the structural work and casting work carried out on the Samera Djohor Model House and Fence construction project in Deli Serdang Regency, it was concluded that:

1. Defects occurred in the beams and columns during the structural work, resulting in a lack of supervision during the casting process.
2. Lack of site access resulted in incorrect concrete pump orders, resulting in the completion of the reinforcement and plate work. Difficulties occurred during casting, leading to delays in the column casting work.

4.2. Suggestions

Based on the planning results for the construction of the Samera Djohor Model House and Fence in Deli Serdang Regency, several recommendations can be considered for future similar projects, including:

1. A shared understanding is needed from all parties involved in the implementation and technical aspects to ensure optimal project execution.
2. Careful attention must be paid to project planning, including a lack of effective workflow management and any unintentional errors made by the workforce during the project. Planning errors, such as inaccurate designs, inconsistencies in the installation of reinforcing bars, and errors in the casting process, must be addressed to ensure the project runs smoothly

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