Time Performance Analysis of Hotel Building Construction Project Using Performance Intensity Method

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Abstract* — *In project implementation, both owners and contractors place great emphasis on timely completion. However, project delays often occur, necessitating an effective time performance analysis method to minimize the risk of delays. Therefore, a project time performance analysis was conducted by comparing actual field data with the initial plan. This study used a quantitative descriptive approach by analyzing variables from field observation data. The project was scheduled for completion on December 30, 2025, with a duration of 514 calendar days. The analysis was conducted in the 35th and 48th weeks of project implementation. The results in the 35th week showed a slower project completion prediction, namely around February 22, 2026. However, in the 48th week, the project was estimated to be completed earlier, namely on December 27, 2025, where the contractor could save 0.564% of the overall progress of the plan that had been implemented.

Keywords: performance intensity; time performance; project management.

I. INTRODUCTION

A project is a temporary endeavor to produce a unique product, service, or outcome, particularly in infrastructure, such as the construction of buildings, roads, bridges, and areas. Projects have time, budget, and resource constraints that must be met to achieve agreed-upon objectives. However, mismatches between planning and implementation often occur, leading to delays. Approximately 30% of construction projects in Indonesia experience delays, although many are completed on time or earlier (Kementrian PUPR, 2019).

Delays in construction projects are a common problem during implementation, causing fieldwork to fall short of the initial plan. Data from the Ministry of Public Works and Housing (PUPR) shows that the main obstacles in infrastructure projects are delays in material deliveries and unforeseen field conditions. In the Summarecon Serpong Hotel construction project, although a delay occurred in one phase of the work, it did not impact the overall project completion schedule.

Project time performance analysis is a method for assessing and measuring the extent to which a project is progressing according to a predetermined schedule. This hotel construction project employed the Performance Intensity (PI) method, a measurement ratio that determines the pace of work using a simple and easy-to-understand scheduling equation (Sugiyanto & Umam, 2021). A study by Chen and Reichelt (2018) showed that applying the Performance Intensity method can improve the accuracy of project duration and final cost predictions by up to 30% compared to conventional methods, based on research on 87 infrastructure projects across various countries.

This study aims to analyze the time performance of the Summarecon Hotel construction project in Tangerang Regency using the Performance Intensity method. Furthermore, this study compares actual field performance results with the estimated duration generated by the Performance Intensity method to determine the time required to complete the project.

II. LITERATURE REVIEW

According to Dr. Hafnidar A. Rani (2016), Construction Management involves a series of processes including planning, implementing, and controlling project activities by allocating resources effectively and efficiently to achieve satisfactory results in line with predetermined goals. It can also be understood as carrying out activities in a manner that maximizes efficiency and effectiveness.

Building on this, time performance specifically focuses on comparing actual work progress against the planned schedule. Project time performance measures how well a project is completed within the allocated timeframe and is a critical element of project management. As emphasized by Dipohosodo (1996), the ability to complete a project on time often serves as a key

indicator of its overall success or failure, making time performance essential for effective construction management.

According to Winda Nur Ayni et al. (2019), Performance Intensity is the core of momentum management calculations. It functions as a ratio to measure the pace of project work, providing information on how quickly an activity is completed. This method allows for adjustments to the speed of certain activities to accelerate others for optimal results and supports subsequent decision-making.

The Performance Intensity concept originated with Murray, who desired a simple and easy-to-understand project scheduling formula, focusing on time rather than work volume. Therefore, the variable duration days, which represents the volume of work completed in one activity day, is used in this formula. Another variable, work days or work performance, serves as the numerator in the Performance Intensity formula.

There are indicators, variables and project time status as follows:

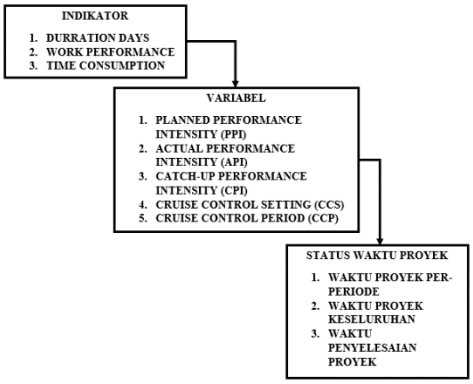

Figure 1. Performance intensity components

III. METHOD

The research method in this study applies a descriptive quantitative method that aims to describe the conditions or research variables based on facts using document analysis. The analysis focuses on the time aspect to assess project performance by examining indicators, variables, project time status, and projecting project completion estimates. The sample was taken using a purposive sampling technique, which selects samples deemed most representative based on the researcher's assessment. The research instrument is a form used to process secondary data, such as planning time schedules, actual time schedules, and weekly progress reports, to measure research variables quantitatively.

1. Research Place

The location of this research was conducted in Tangerang Regency with a hotel construction project located next to Summarecon Mall Serpong.

2. Reserce Time

The research period is the length of time required by the researcher to conduct observations and data collection in the field. The length of the research period is determined by the researcher according to their needs. This research period was conducted over five months, from February 2025 to June 2025.

3. Data

This study used primary data in the form of unstructured interviews and secondary data obtained directly from the contractor. The secondary data consisted of the planned time schedule, the actual time schedule,
and weekly progress reports.

4. Data Analysis Procedure

The research flowchart serves as the basis for conducting the research, and the stages are generally displayed in the following flowchart:

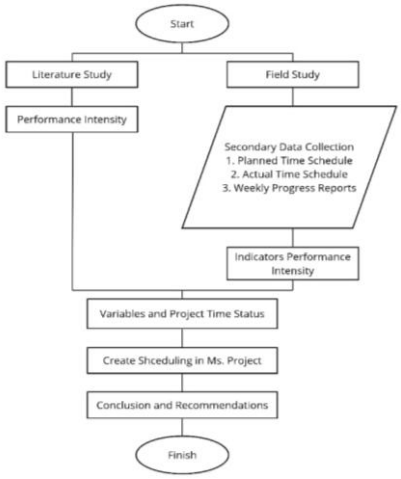

Figure 2. Flowchart

IV. RESULTS AND DISCUSSION

1. Perform variable calculations

a. Duration days

Duration days is the volume of work required to complete a project activity in one day. The value of duration days can be seen on the S-Curve in weeks or in the weekly project progress report.

a) Value 1 duration days work Preliminaries
   100%: 532 days = 0.19%

The following is a recapitulation of the value of 1 duration day.

Table 1. Value of 1 duration days in work activities

NO	JOB DESCRIPTION	DURATION (days)	VALUE 1 DAY DURATION
	Preliminary Jobs	532	0.19%
2.1.	Structural Work Hotel Building		
	Earthworks	30	3.33%
	Substructure Work	51	1.96%
	Concrete Structure	242	0.41%
2.2.	Supporting Building (Power House)		
	Earthworks	13	7.69%
	Substructure Work	29	3.45%
	Superstructure Work	67	1.49%
3.1.	Architectural Work Wall & Partition Pairs	92	1.09%
	Facade Work	258	0.39%
	Guest Room Jobs	282	0.35%
	Meeting Room & Function Work	165	0.61%
	Facility Work	121	0.83%
	Operational Work	107	0.93%
	Circulation Work	245	0.41%
	My Space Job	165	0.61%
	Mall Extension Work Demolition Work	50	2.00%
	Mall Structural Work	347	0.29%
	Exterior Work	95	1.05%
	Provisional Sum	161	0.62%
	Job Plus Minus	413	0.24%
	Direct Contractor	513	0.19%

The volume at completion of 1 (one) duration day can be concluded by the existence of project work activities given a value of 1 (one) by going through the stage of calculating the percentage of progress (%), calculating duration days with the formula and calculations in the 50th week as follows:

Example of progress percentage calculation:

a) Percentage progress of preliminary work plan

$$\frac{0{,}0326}{15{,}212} x100 = 2.143\%$$

Furthermore, the calculation of duration days for each job is obtained as follows.

a) *Duration days* actual preliminires $= \frac{2{,}143\%}{0{,}19\%} = 11.4 \approx 11/7 = 1.57 \approx 1$

Because the calculation of 2.143% is a calculation for each period, the resulting duration days can be divided into 7 (seven), namely the number of days in 1 (one) period.

b. Work Performance Calculation

Work performance is a measure of the speed or rate of completion of an activity or job in a project during a certain period.

Table 2. Planned and actual work performance of the summarecon serpong hotel development project

PERIOD	DAY 4-	DURATION DAYS	
		PLAN	ACTUAL
1	7	0	0
2	14	0	7
3	21	7	35
4	28	7	7
5	35	14	0
6	42	7	0
7	49	7	0
8	56	14	14
9	63	14	14
10	70	14	21
11	77	14	7
12	84	0	0
13	91	0	21
14	98	0	7
15	105	7	7
16	112	7	28
17	119	7	7
18	126	0	7
19	133	0	21
20	140	0	7

c. Time Consumption

Time consumption is the time used in a period or the duration spent in a period. The number of periods in this study was 7 (seven) days.

2. Performing indicator calculations

1) Planned Performance Intensity and Actual Performance Intensity

Using field observation data and analysis from weekly reports, calculations yield Planned Performance Intensity and Actual Performance Intensity values, which provide information on the project's time status related to its performance in each period. This information is used to determine whether the actual fieldwork is delayed, accelerated, or on schedule. The following is a comparison chart.

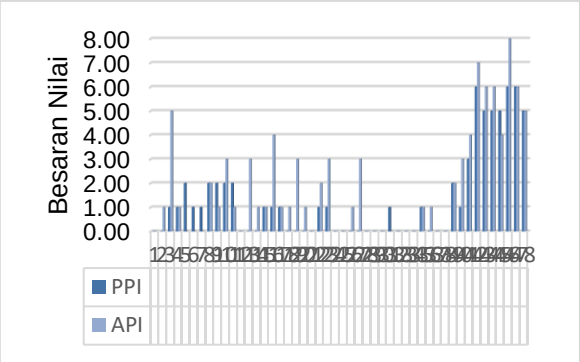

Figure 3. Comparison chart of actual and planned performance intensity

The results obtained that the deviation in the calculation showed the largest negative number at 100% in the 5th to 7th period and the 31st period, this indicates that the time performance was not achieved which indicates a project delay from the planned schedule. The delay in the 5th to 7th period occurred because there was no forcon drawing of the ballroom column in the precast area and stairs which resulted in the delay in making shop drawings and the implementation of work in the field could not be carried out. Then the deviation that had the largest positive sign was at 400% in the 3rd period where it showed that the time performance was achieved and indicated an acceleration of the project from the planned schedule. The acceleration carried out in the 3rd period was carried out to minimize the time that could potentially experience delays in the next period.

2) Cruise Control Period and Cumulative Actual Performance Intensity

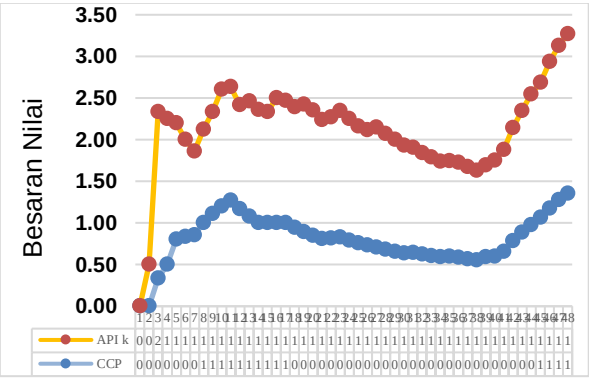

Figure 4. Cruise Control Period and Cumulative Actual Performance Intensity Graph

The calculation of the Cruise Control Period and Cumulative Actual Performance Intensity variables can be explained that the project experienced a deviation of 0% in each period, which indicates that the cumulative project was on time in each period and in some periods experienced faster work implementation resulting in the project being completed faster than the specified time target.

3) Catch-up Performance Intensity

The catch-up Performance Intensity calculation will determine how much Performance Intensity must be achieved in the next period. In the 44th period, the Performance Intensity that must be achieved in the 45th period is 0.170.

4) Cruise control settings

Cruise Control Setting is the average Planned Performance Intensity from project inception to completion. Cruise Control Setting is typically used to determine the Planned Performance Intensity requirements that must be achieved in each period. In this study, the Cruise Control Setting variable value was 1.354.

3. Project Time Status

Total planned duration of the project is 532 days, by going through variable analysis and Performance Intensity calculations, it is obtained that the project requires 529 days to complete the project, where the project is accelerated and it is certain that the contractor can save time by 0.564% of the total work progress.

V. CONCLUSION

1. The time performance analysis of the Summarecon Serpong Hotel Development Project found that the project experienced delays at the beginning of the period, but the contractor was able to catch up on the delays so that at the end of the period the project did not experience delays and achieved good performance by spending 529 days out of a total time of 532 days.
2. The project completion date prediction revealed a two-day acceleration, indicating the contractor achieved efficiency, saving 0.564% of the total project time.

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