Key Factors Affecting Time Planning on the Long Segment Road Project Implementation

Dewanto, Tjiptogoro Dinarjo Soehari, Mawardi Amin

***Abstract:** One of the delay cause in the project construction implementation is the time planning that is not done properly by the contractor. Also included project delays which occur in segment of the road projects implementation in the range of 50 km to 100 km and can have more than one segment. In this research, a statistical analysis will be carried out to obtain all factors that affecting the time planning process in the implementation of the long segment road and how it affects the project time performance. The strategy for Research data collection is by using survey methods to distributing questionnaires to respondents who have competence in the implementation of long segment road work. While the processing and analysis of data using SPSS software. Based on the results of statistical data analysis shows key factors that affecting time planning for the implementation of the long segment are conformity of the existing conditions with the results of time planning, the length of the road handling section, ineffective work methods, software used, and the time needed in the planning process. Dominant factors that influence time planning have a significant effect of 76.70% on project time performance, while 23.30% is influenced by other factors.*

***Keywords:** Time Planning, Long Segment Road*

I. INTRODUCTION

Factors causing delays in the implementation of construction projects in Indonesia include labor expertise, delays in the supply of equipment, changes in design, access to project sites, delays in delivery of materials, planning and scheduling, rainfall intensity, poor communication and problems of late payment from the owner [1]. Meanwhile, according to research conducted on 1,722 road projects in Indiana United States by Anastasopoulos et al (2012), project delays are caused by the amount of project financing offered, the type of project, the duration of the project in planning and bad weather. Research conducted on the construction industry in Malaysia, shows that factors that cause delays in project implementation include improper contractor planning, poor site or field management, contractor experience, inadequate contractor finance, problems with subcontractors, material shortages, labor supply and equipment availability and damage [3]. Based on preliminary survey results related to delays in road projects that are not free land, demands for long changes in work, disruption of material supply, poor planning from contractors, age of old heavy equipment, selection of improper working methods and inexperienced workers from the contractor..

One factor that often causes delays in construction projects is the poor planning and scheduling factors of the contractor. In this study, the author will examine and analyze how the influence of factors in time planning on the implementation of construction projects. The object of this research is a road project with a long segment scheme organized by the Directorate General of Highways of the Ministry of Public Works and Public Housing.

Revised Manuscript Received on October 30, 2019.

* Correspondence Author

Dewanto*, Master Program of Civil Engineering, Mercu Buana University, Jakarta Indonesia. Email : dewantojakon@gmail.com

Tjiptogoro Dinarjo Soehari, Master Program of Civil Engineering, Mercu Buana University, Jakarta Indonesia. Email : tjiptogd@yahoo.com

Mawardi Amin, Master Program of Civil Engineering, Mercu Buana University, Jakarta Indonesia. Email : mawardi.amin@mercubuana.ac.id

II. LITERATURE REVIEW

A. Time Planning

Time planning or scheduling is one of the elements of planning that can provide information about plan schedules and project progress in terms of resource performance in the form of costs, labor, equipment and materials as well as project duration plans and progress time for project completion, the process in the form of activity preparation and the relationship between activities is made in more detail and detail [4]. Whereas according to PMBOK (2017), project scheduling provides a detailed plan that represents how and when the project will provide products, services, and outcomes that are defined in the project scope and serve as a tool for communication, managing stakeholder expectations, and as a basis for performance reporting. Factors that affecting the process of time planning or scheduling based on some literature, including:

- Culture and organizational structure [5].
- Standard organizational procedures [5].
- Delay in the flow of information between parties [6].
- Control the results of planning [7].
- Lack of coordination between parties [6].
- Ineffective work methods [8]
- Scheduling method [7].
- Assumed bad weather planned [2].
- The time needed in the planning process
- Software used [5][7].
- Less experienced planners [8].
- Limited number of planning staff [8].
- Competency planners [6].
- The length of the road handling section.
- Conformity of the existing conditions with the results of time planning.

B. Long Segment Road

The Road Long Segment Scheme is to divide the length of national roads in segments that range in length from 50 km to 150 km. Long Segments must be maintained continuously or uninterrupted, except under certain conditions. The purpose of carrying out road works with the Long Segment scheme is to make national roads a Steady and Standard Road throughout the segment. There are two targets or performance indicators in achieving these objectives, namely the strategic target in the form of the level of connectivity of national roads and the level of stability of national roads. and program targets in the form of travel time in the main corridor, the level of use of national roads and the level of facilities on regional roads to support the region.

III. RESEARCH METHODOLOGY

The methodology used in this research is quantitative descriptive, which is analyzing by describing data that has been collected from a particular population or sample taken randomly. The strategy applied in this research is the survey strategy. The survey used to obtain these data either in the form of primary data (data originating directly from the original or first source) is the questionnaire method, structured interviews and direct observations. While the secondary data (data obtained indirectly, obtained from other parties) will be complementary to the primary data, so it is expected that accurate data related to the research topic can be obtained.

The questionnaire data collection process was carried out in the period from May 2019 to June 2019 on the Long Segment road construction project. The questionnaire was distributed directly in the form of hardcopy and indirectly in the form of softcopy. The number of questionnaires distributed as many as 55 pieces, while the questionnaires returned 48 pieces and did not return 7 pieces with a response rate of 88.89%.

The next stage after the data is collected is the right data analysis so that the results are in accordance with the objectives of the study. In this study data analysis using SPSS software.

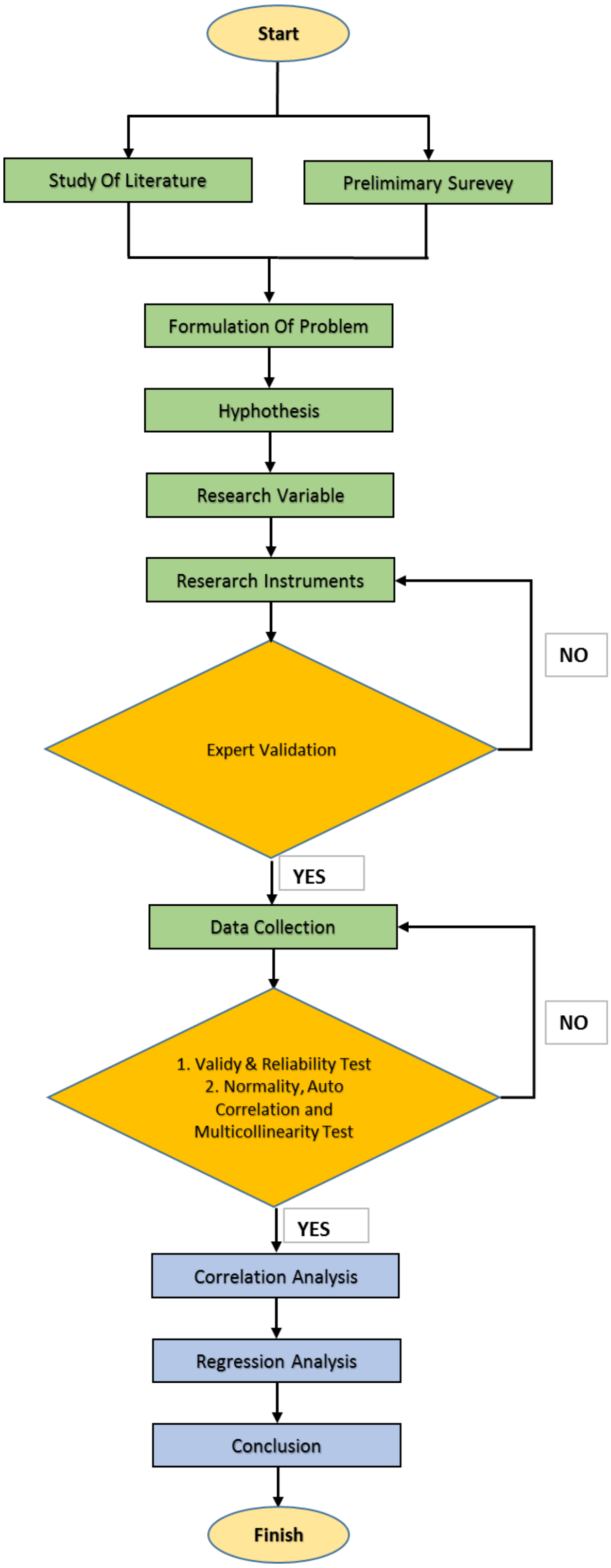

Figure 1. Research Flow Chart

Retrieval Number: A1617109119/2019©BEIESP
DOI: 10.35940/ijeat.A1617.109119
Journal Website: www.ijeat.org

Published By:
Blue Eyes Intelligence Engineering
& Sciences Publication

IV. RESULT & DISCUSSION

A. Validity & Reliability Test

Table 1. Validity Test and Reliability Test Results

No	Factor	Corrected Item	Cronbach's Alpha
1	Culture and organizational structure	0.343	0.788
2	Standard organizational procedures	0.456	0.782
3	Delay in the flow of information between parties	0.362	0.787
4	Control the results of planning	-0.004	0.805
5	Lack of coordination between parties	0.422	0.782
6	Ineffective work methods	0.597	0.774
7	Scheduling method	0.532	0.775
8	Assumed bad weather planned	0.086	0.807
9	The time needed in the planning process	0.392	0.785
10	Software used	0.287	0.793
11	Less experienced planners	0.469	0.778
12	Limited number of planning staff	0.574	0.767
13	Competency planners	0.585	0.767
14	The length of the road handling section.	0.443	0.780
15	Conformity of the existing conditions with the results of time planning	0.523	0.773

Source : SPSS Data Processing (2019)

The criteria set for the reliability test is if the value of "Çronbach Alpha" > 0.600 then the sub-variable is declared Reliable. Based on Table 1 shows the value of variables number 1 to number 15 has a value of "Çronbach Alpha" > 0.600, so it is declared **Reliable**.

The criteria set for the validity test depending on the number of respondents tested, in this case the study was 48 respondents. Based on the table r (Pearson product moment) for the two-tailed test at the significance level of 0.05 with 48 respondents, the r table value = 0.284 was obtained. So the sub-variables that have "Corrected Item-Total Correlation" > 0.284 will be declared Valid. Based on Table 1 shows the no. 4 variable and no. 8 variable shows the value "Corrected Item-Total Correlation" < 0.284 so it is declared **Invalid**, while other variables show the value "Corrected Item-Total Correlation" > 0.284 then it is declared **Valid.**

B. Normality, Auto Corelation & Multicollinearity Test

To ensure that the data to be analyzed is normally distributed, it is necessary to test the normality of the respondent's data. The normality test used is the Kolmogorov-Smirnov test. Based on the Kolmogorov-Simirnov test results showed the value "Asymp. Sig. (2-tailed)" < 0.05 so that this shows that the research data from respondents **Not Distributed Normal**. Therefore, the respondent's data needs to be normalized by making a Z-Score correction.

To ensure there is no correlation between confounding errors in period t and errors in period t-1 (previous), it is necessary to do an autocorrelation test. The basis used is if du < d < 4 - du then it is stated that there is no autocorrelation. Based on the results of the autocorrelation test showed that the value of d = 2.183 then 1,721 < d <2,279 so that it can be stated that the data contained **No Autocorrelation.**

Meanwhile, to ensure there is no high correlation (intercorrelation) between independent variables, it is necessary to do a multicollinarity test. The basis is if the Tolerance value> 0.1 and the VIF (Variance Inflation Factor) value <10 then it is stated that there is no multicollinearity. The results of multicollinearity test showed that the Tolerance value > 0.1 and VIF value < 10, so it can be stated that there is **No Multicollinearity**.

C. Correlation Analysis

Table 2. Correlation Analysis Results

Rank	Factor	Sig. (2-tailed)	Expl
1	Conformity of the existing conditions with the results of time planning	.605**	Strong
2	The length of the road handling section.	.509**	Moderate
3	Ineffective work methods	.411**	Moderate
4	Software used	.365*	Weak
5	The time needed in the planning process	.321*	Weak
6	Limited number of planning staff	0.284	Weak
7	Scheduling method	0.275	Weak
8	Culture and organizational structure	0.261	Weak
9	Standard organizational procedures	0.225	Weak
10	Delay in the flow of information between parties	0.212	Weak

Source : SPSS Data Processing (2019)

To obtain the dominant factors that most influence the time planning process in the implementation of the long segment road is the correlation analysis method. Based on table 2 shows that the five dominant factors that influence time planning are conformity of the existing conditions with the results of time planning, the length of the road handling section, ineffective work methods, software used, and the time needed in the planning process.

D. Regression Analysis

Dominant factors that influence time planning on the implementation of long segment roads are then analyzed their effects on project performance in this case the project time performance using linear regression analysis. These factors will be independent variables and project time performance is the dependent variable, with the regression model equation as follows:

$$Y = a + b1X1 + b2X2 + b3X3 + b4X4 + b5X5 + e$$

Description : Y = variable "project time performance", X1 = variable "conformity of the existing conditions with the results of time planning", X2 = variable "the length of the road handling section", X3 = variable "ineffective work methods", X4 = "software used", X5 = "the time needed in the planning process".

Table 3. Regression Analysis Results

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.263	0.431		2.866	0.007
	Conformity of the existing conditions with the results of time planning	0.207	0.078	0.368	2.668	0.011
	The length of the road handling section	0.161	0.071	0.299	2.270	0.029
	Ineffective work methods	0.125	0.104	0.142	1.193	0.241
	Software used	0.073	0.061	0.137	1.184	0.244
	The time needed in the planning process	0.156	0.053	0.327	2.911	0.006

a. Dependent Variable : Project Time Performance

Source : SPSS Data Processing (2019)

Based on the results of the linear regression analysis in Table 3, the regression mathematical model equation is obtained as follows:

$$Y = 1.236 + 0.207X1 + 0.161X2 + 0.125X3 + 0.073X4 + 0.156X5 + e$$

E. T Test Regression Analysis

T test is used to see the significance of the influence of independent variables individually on the dependent variable by assuming other variables are constant.

Based on Table 3 shows that variable X1 has a value (0.207) with Sig. (0.011), the X2 variable has a value (0.161) with Sig. (0.029) and the X5 variable has a value (0.156) with Sig. (0.006), this shows that the variables X1, variable X2 and variable X5 have positive values, which means the better the value of the variables X1, X2 and X5 will have a positive or improved effect on the variable Y (project time performance). While the Sig. < 0.05 which means that variable X1, variable X2 and variable X5 have a significant influence on the variable Y (project time performance).

While the X3 and X4 variables have positive values, but the Sig. > 0.05 which means that variable X3 and variable X4 have a positive influence on the variable Y (project time performance), but the effect is not significant.

F. F Test Regression Analysis

F test is performed to be able to see the effect of the overall independent variables on the dependent variable. F test results can be seen in table 4.4 as follows :

Table 4. F Test Regression Analysis Results

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.784	5	.757	9.978	.000[b]
	Residual	2.655	35	.076		
	Total	6.439	40			

a. Dependent variable : Project Time Performance
b. Predictors : (Constant), conformity of the existing conditions with the results of time planning, the length of the road handling section, ineffective work methods, software used, the time needed in the planning process

Source : SPSS Data Processing (2019)

Based on Table 4 shows that the value F count (9,978) > F table (2,610) and the value of Sig. 0,000 < 0.05, which means the combination of independent variables together (X1, X2, X3, X4, X5) has a significant effect to Y variable (project time performance).

G. Determination Test (R^2)

R^2 test is performed to show the coefficient of determination in linear regression, which means how much the ability of all independent variables in explaining the variance of the dependent variable. R^2 test results can be seen in table 4.5 as follows :

Table 5. R^2 Test Regression Analysis Results

Modal Summary[b]

Retrieval Number: A1617109119/2019©BEIESP
DOI: 10.35940/ijeat.A1617.109119
Journal Website: www.ijeat.org

Published By:
Blue Eyes Intelligence Engineering
& Sciences Publication

Model	R	R Square	Adjusted R Square	Std Error of The Estimate	Dubin -Watson
1	.767[a]	.588	.529	.27541	2.183

a. Predictors : (Constant), conformity of the existing conditions with the results of time planning, the length of the road handling section, ineffective work methods, software used, the time needed in the planning process.

b. Dependent variable : Project Time Performance

Source : SPSS Data Processing (2019)

Based on Table 5, the R2 value or determination coefficient is 0.767, which means that the variable X1 (conformity of the existing conditions with the results of time planning), X2 (the length of the road handling section), X3 (ineffective work methods), X4 (software used) and X5 (the time needed in the planning process) can explain the variability of 76.70% of the Y variable (performance project time), while the variability of 23.30% is explained by variables other than variables X1, X2, X3, X4 and X5.

V. CONCLUSION

Based on data processing and analysis, it can be summarized as follows :

- Dominant factors that influence time planning on the implementation of long segment roads are conformity of the existing conditions with the results of time planning, the length of the road handling section, ineffective work methods, software used, and the time needed in the planning process.
- Project time performance is influenced simultaneously by variables conformity of the existing conditions with the results of time planning, the length of the road handling section, ineffective work methods, software used, the time needed in the planning process of 76.70%, while 23.30% is influenced by other variables.

REFERENCES

1. Widhiawati, R. (2009). Factors Causing Delay in the Implementation of Construction Projects I.A, Teknologi Elektro, Vol. 8 N 109 Juli.
2. Anastasopoulos, P. Ch., Labi, S., Bhargava, A., & Mannering, F. L. (2011). Empirical Assessment of the Likelihood and Duration of Highway Project Time Delays. Journal of Construction Engineering and Management, 138(3), 390–398. 9
3. Sambasivan, M., & Soon, Y. W. (2007). Causes and effects of delays in Malaysian construction industry. International Journal of Project Management, 25(5), 517–526. 1` ``
4. Husen, Abrar. (2011). Project Management - Revised Edition, Project Scheduling and Control Planning. Publisher Andi, Yogyakarta.
5. PMBOK® Guide – Sixth Edition. (2017). PMBOK® Guide – Sixth Edition. Stakeholder Needs and Requirements. Retrieved from https://www.pmi.org/pmbok-guide-standards/foundational/pmbok/sixth-edition
6. Nagapan, S., Abdul Rahman, I., & Asmi, A. (2013). Factors Contributing to Physical and Non - Physical Waste Generation in Construction Industry. International Journal of Advances in Applied Sciences, 1(1). https://doi.org/10.11591/ijaas.v1i1.476
7. Laufer, A., & Tucker, R. L. (1987). Is construction project planning really doing its job? A critical examination of focus, role and process. Construction Management and Economics, 5(3), 243–266. https://doi.org/10.1080/01446198700000023
8. Honrao, M. Y., & Desai, P. D. B. (2015). Study of Delay in Execution of Infrastructure Projects –Highway Construction. International Journal of Scientific and Research Publications, Volume 5, Issue 6, June 2015, 5(6), 1–8.
9. Husin, A.E.,Kussumardianadewi, B.D.,Susandi.(2019)," Time Performance Upgrade on Toll Road Construction Project By M-Pert"www.ijcrls.com2019;08(01):3035-3042.
10. Arditi, D., & Albulak, M. Z. (2008). Line-of-Balance Scheduling in Pavement Construction. Journal of Construction Engineering and Management, 112(3), 411–424. https://doi.org/10.1061/(asce)0733-9364(1986)112:3(411)
11. Bhoyar, S., & Parbat, D. K. (2014). Optimal scheduling for repetitive construction projects with multiple resource crews. International Journal of Emerging Technology and Advanced Engineering, 4(6), 302–307
12. Gebrehiwet, T., & Luo, H. (2017). Analysis of Delay Impact on Construction Project Based on RII and Correlation Coefficient: Empirical Study. In Procedia Engineering (Vol. 196, pp. 366–374). Elsevier Ltd. https://doi.org/10.1016/j.proeng.2017.07.212
13. Adeli, H. (2018). Construction Scheduling, Cost Optimization and Management. Construction Scheduling, Cost Optimization and Management. CRC Press. https://doi.org/10.1201/9781482267686
14. Kaliba, C., Muya, M., & Mumba, K. (2009). Cost escalation and schedule delays in road construction projects in Zambia. International Journal of Project Management, 27(5), 522–531. https://doi.org/10.1016/j.ijproman.2008.07.0
15. Nunnally, SW (2007). Construction methods and management: Seventh edition). https://doi.org/10.1017/CBO9781107415324.004
16. Suhail, S. A., & Neale, R. H. (2006). CPM/LOB: New Methodology to Integrate CPM and Line of Balance. Journal of Construction Engineering and Management, 120(3), 667–684. https://doi.org/10.1061/(asce)0733-9364(1994)120:3(667)
17. Zolfaghar Dolabi, H. R., Afshar, A., & Abbasnia, R. (2014). CPM/LOB scheduling method for project deadline constraint satisfaction. Automation in Construction, 48, 107–118. https://doi.org/10.1016/j.autcon.2014.09.003
18. Mubarak, S. (2010). Construction Project Scheduling and Control. Construction Project Scheduling and Control. John Wiley & Sons, Inc. https://doi.org/10.1002/9780470912171
19. Hyari, K., & El-Rayes, K. (2005). Optimal Planning and Scheduling for Repetitive Construction Projects. Journal of Management in Engineering, 22(1), 11–19. https://doi.org/10.1061/(asce)0742-597x(2006)22:1(11)

AUTHORS PROFILE

Dewanto, Master Program of Civil Engineering, Mercu Buana University, Jakarta Indonesia.

Tjiptogoro Dinarjo Soehari, Master Program of Civil Engineering, Mercu Buana University, Jakarta Indonesia.

Mawardi Amini, Master Program of Civil Engineering, Mercu Buana University, Jakarta Indonesia.