

# Relationship Between Time Control And Cost In The Implementation Of Maintenance Project On Harun Nafsi To H.M. Rifadin Street, Samarinda, East Borneo

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**Abstract:** This research aimed to describe a number of variables relating to the issue and learn about the phenomenon. In this research, the technique used to collect research data was by using questionnaire, as an instrument to answer a set of questions or a written statement from the respondents. Respondents of the research were 100 respondents. Sample determination of the research used purposive sampling method. This research used Structural Equation Modeling (SEM) analysis with Analysis Moment of Structure (AMOS) and Special Package for Statistics Science (SPSS) software. Based on the results of the research, it were obtained 1) project performance has a positive and significant impact on time intensity of road maintenance project, which means if time increases with coefficient of 0.218, it will increase project performance of road maintenance project, 2) project performance has a positive and significant impact on cost of road maintenance project, which means if project performance increases with coefficient of 0.764, it will increase cost of road maintenance project, 3) cost has a positive and significant impact on time intensity of road maintenance project, which means if time increases with coefficient of 0.798, it will increase cost of road maintenance project.

**Index Terms:** cost, project performance, time.

## 1 INTRODUCTION

A process of project planning cannot guarantee that the implementation will run well. It is because problems keep growing every day, such as weather factors, material delays, labor shortages, equipment damage, labor accidents and other conditions that may disrupt the original planning [1]. In an ongoing project, some changes are needed during the implementation process; such changes may be due to the willingness of the owner, planner or contractor. Control is an activity that binds the overall activities that exist in the project management. Planning and organizing are indeed activities that affect the project, but effective project control is the most important thing. In this case, we can make some discreteness in planning and organizing, but we should not make mistakes in project control [2]. Cost and project progress schedule control has become the project target of the project control system since 1970 [3].

Implementation Document, as a project control tool, is required to anticipate the deviations that may occur by providing an early warning; how much performance of the work to be achieved at any given time through the reference standard that is used as the basis for the measurement, so that in case of deviation, corrective action may take place before a more serious problem occurs [4]. According to Kerzner [5], project management is planning, organizing, leading and controlling the company's resources to achieve short-term goals that have been determined. Next, project management uses a systematic approach and vertical and horizontal hierarchy (stream of activities). Implementation of a project is actually a process of transforming certain resources and funds in an organized manner into a solid development outcome in accordance with the initial objectives and expectations; all must be implemented within a certain period. A project can be defined as a temporary activity that lasts for a limited time with a certain allocation of resources and is intended to carry out tasks with clearly defined targets [6]. Planning is one of the vital functions in project management activities. Therefore, to achieve the project objectives, the management must make proactive steps in conducting comprehensive planning so that goals and objectives can be achieved. Planning is considered as good if the entire process of activities in it can be implemented in accordance with the goals and objectives that have been set with minimal deviation rate and the maximum result [7]. The project can be defined as a temporary activity that lasts for a limited time with a certain allocation of resources and is intended to carry out tasks with clearly defined targets [6]. Construction maintenance is the stage of testing and examination of the results of physical construction implementation. In this period of maintenance, the construction service provider shall be obligated to fix any defects or damages and deficiencies incurred during the construction period. During the maintenance period, all equipment installed inside and outside the building must be tested according to its function. Performance refers to the level of success in performing the task and ability to achieve the goals. Performance is considered as good and successful if the

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desired goal can be achieved well [3]. The criteria assessments for project performance are those that will be examined in the quality control problem on the aspect of cost and time performance. The function of planning intends to put the basic objectives of the project, namely schedule, budget and time. The process of control consists of a variety of steps that are performed systematically; in order to have a control system that runs effectively, the following elements will be required [8]

- a. Clear benchmarks.
- b. Devices that can process quickly and precisely.
- c. Accurate forecasts
- d. Action plan.

Control actors are all parties involved during the construction process, including: owners, contractors, consultants and other related parties. The control devices include; implementation schedule, technical design drawings (work drawings), organizational structure of work, report of coordination meeting/control project, project implementation report, employment contract, field monitoring report, and so on. The schedule, change of work, government regulations, procurement of materials and tools, affect the construction time [9]. Project time schedule is a tool that can indicate when each activity is taking place, so that it can be used in planning the activities as well as for overall project implementation control. Direct cost of the project is cost associated directly with the implementation of construction work in the field [6]. These costs are materials costs, labor costs/wage and equipment costs. The construction process of a project is essentially a series of activities based on a system of construction engineering; it is unique to each project [10]. In the process of construction implementation, there are 4 aspects that need to be considered for the control that consists of:

- a. Cost aspect
- b. Time aspect
- c. Quality aspect
- d. Health and Safety (K3) aspect.

If the four aspects are not planned and controlled properly, they will degrade the performance of the implementation and will result in the decline in the product performance of cost, time and quality. According to the Constitution of the Republic of Indonesia No. 38 of 2004, concerning roads, road is a land transportation in any form includes all parts of the road including complementary buildings and its equipment which is intended for traffic. Road has a role to encourage the development of all units of development areas, in an effort to achieve inter-regional development. Road is a unified road network system that binds and connects growth centers with other areas. Road construction is a construction made in such a way that it can carry the traffic load (vehicle) that passes over it without undergoing structural changes on the road surface. With the development of land transportation, especially motor vehicles that cover the type of size and quantity, the problem of the smooth flow of traffic, safety, comfort and carrying capacity of the pavement should be a main concern [11]. Road structure based on pavement structure can be divided into 4 (four) important parts, namely:

- a. Surfaces Course
  - 1) Hardened retaining wheel course, the course has high stability to retain the wheel load during service period.
  - 2) Waterproof course, so that the rain falling on it does not seep into the course below and weaken the courses.
  - 3) Wear course, a course that immediately suffers from friction of brake so that it is easy to wear out.
  - 4) Courses that spread the burden to lower course so that it can be borne by other courses that have a poorer carrying capacity.
- b. Base Course
  - 1) The pavement section that holds the latitude of the wheel load and spreads the load to the course below it.
  - 2) The permeating course for the bottom foundation course.
  - 3) Bearing of surface course.
- c. Sub-Base Course
  - 1) Part of pavement construction to spread the wheel load to the base ground.
  - 2) Efficiency of material use and reducing the thickness of the course above.
  - 3) Permeating course, so that groundwater is not collected in the foundation.
  - 4) Courses to prevent fine particles from the base soil rises to the base course.

#### d. Sub-Grade Course

Courses of soil as thick as 50-100 m will be placed under the sub-base course called the base ground. The sub-grade course can be the original soil if the original soil is good, the soil is imported from another place and compacted or the soil is stabilized with lime or other materials. Physical quality of the road is a kind of road surface conditions in providing services. The physical quality of the road is considered as good if the services provided are maximal on the road users in accordance with the development plan, namely in terms of comfort, safety and durability. To overcome this, we need a method to make the road condition to remain stable in quality and remain comfortable to use through the preparation of road maintenance programs, both routine maintenance and periodic maintenance whenever needed. Road maintenance is a good/medium conditioned road handling activity that must be prioritized to be handled, so that the road be functioning in accordance with the calculation and keep the road surface close to its original condition.

## 2 RESEARCH METHOD

Research is a long and thorough process which begins with an interest in knowing a particular phenomenon. From the results of the observations, it is obtained data in the form of information to be analyzed and finally to draw the necessary conclusions. The method to be used in this research is "Descriptive Statistics", which is the data collection was obtained from collecting the data in the field or in the laboratory. By using the research method, the research was conducted quantitatively and qualitatively.

### 2.1 Research Constructs

Based on the subject matter, the variables in the analysis can be identified in outline as follows. In this research there are two types of constructs that will be used that are independent

constructs or often known as exogenous constructs and dependent constructs known as endogenous constructs.

## 2.2 Population and Sample

Population is a generalization region consisting of objects or subjects that have certain qualities and characteristics [12]. Population in this research is job director/technical team representing the job owner, service provider/contractor, consultant planner and supervisory consultant who have been involved in maintenance project of Harun Nafsi - H. M. Rifadin Street of Samarinda namely, PT. Wijaya Karya/ Wijaya Karya Inc., PT. Nindya Karya/ Nindya Karya Inc., PT. Citra Kalimantan Pratama/ Citra Kalimantan Pratama Inc., PT. Trialfa Indonesia/ Trialfa Indonesia Inc. and PT. Rexford Pandega/ Rexford Pandega Inc. Sample is part of the population number owned by the population [13]. It is in accordance with the analysis tool used: Structural Equation Modeling (SEM).

## 2.3 Data Collection Method

Technique of collecting data in this research is interview. The interviews are divided into two, namely structured and unstructured interviews. Structured interviews are the way of collecting data through direct meetings or face-to-face with respondents by preparing a list of questions written and alternative answers have also been prepared that are used to obtain information about the assessment of the respondents about the object of research [14].

## 2.4 Research Instruments

The research instrument is a tool used to measure the observed natural and social phenomena [14]. The instrument used in this study is questionnaire.

### a. Measurement Scale

The measurement scale used in this research is Likert scale; it is a scale that has been widely used to ask respondents to mark the degree of approval or disapproval of a series of stimulus objects. Likert scales generally use scale points and degree of approval from strongly disagree to strongly agree. The research used the range from 1 to 5; the value of 1 is categorized as the size of assessment of strongly disagree (STS), the value of 2 shows the size of the assessment of disagree (TS), the value 3 shows the size of the neutral assessment (N), the value 4 shows the size of assessment of agree (S) and value 5 shows the size of the assessment of strongly agree (SS).

### b. Reliability Test

Reliability shows the consistency and stability of a score (measurement scale) [15]. Basically the reliability test shows the extent to which a measuring instrument can give relatively the same results when it is re-measured on the same subject.

### c. Test Validity

The way used in testing the level of validity is by using internal variables; it is to test whether there is suitability between the instruments as a whole. To measure, point analysis is used. Measurement on the point analysis is conducted by having the existing scores then they are correlated by using product moment correlation formula.

## 3 RESULTS AND DISCUSSION

### 4.1 RESEARCH RESULTS

#### a. Characteristics of Respondents

The data were obtained from the questionnaires that have been distributed to 100 respondents. Based on the data, it was obtained the characteristics of respondents as presented in Table 1.

**TABLE 1: DISTRIBUTION OF RESPONDENTS BY DEMOGRAPHIC VARIABLES**

Variable	Classification	Total	
		Person	Percentage
Sex	Male	70	70
	Female	30	30
	Total	100	100
Age (year)	17 - 30	22	22
	>30 - 40	41	41
	>40 - 50	21	21
	>50 - 60	11	11
	≥ 60	6	6
	Total	100	100
Education	Senior High School	31	31
	Diploma	14	14
	Bachelor's Degree/S1	39	39
	Master's Degree/S2	16	16
	Doctoral Degree/S3	0	0
	Total	100	100

#### b. Analysis of Respondents' Perception Descriptions

The description analysis of respondent perception is also using Chi-Square test. Chi-Square test is used to determine any relationships between researches constructs with the characteristics of each respondent.

#### c. The Results of Construction Reliability Test

Basically, the reliability test shows the extent to which a measuring instrument can give the same relative results when it is re-measured on the same subject. The reliability test in SEM is obtained through (1).

$$\text{Construct Reliability} = \frac{(\sum_s \text{tandard loading})^2}{(\sum_s \text{tandard loading})^2 + \sum E_j} \quad (1)$$

**TABLE 2: THE RESULTS OF CONSTRUCTION RELIABILITY TEST**

Construct	Construction Reliability
Planning Design Drawings	0.86
Quality of Service Provider	0.78
Quality of Service Provider Resources	0.78
Design Revision	0.83
Project Control	0.79
Performance Time	0.83
Project Performance	0.81

#### d. The Results of SEM Assumption Test

It is based on the SEM output that was analyzed by using AMOS. The determinant of the sample covariant matrix is 0.003 which means the value of the dimension or construct is

< 0.85 and it means that it is not exposed to multicollinearity [16]; therefore this data is appropriate to use.

#### e. The Results of Measurement Model Test

Based on the results of the analysis, all probability values for each indicator are smaller than 0.05 and the loading factor value is above 0.5.

#### f. The Results of Structural Equation Test of SEM Model

The overall model feasibility test is performed by using SEM which is simultaneously used to analyze the proposed hypothesis. It means that the model fit with the sample data. The result of goodness of fit test of SEM model can be seen in Table 3.

**TABLE 3: THE RESULTS OF GOODNESS OF FIT OF MODEL SEM TEST**

Goodness of Fit Index	Cut – off Value	Analysis Results	Model Evaluation
X <sup>2</sup> -Chi Square	Expected to be small	484.520	Good
Probability	≥ 0.05	0.172	Good
RMSEA	≤ 0.08	0.020	Good
GFI	≥ 0.90	0.852	Marginal
AGFI	≥ 0.90	0.828	Marginal
CMIN/DF	≤ 2.00	1.063	Good
TLI	≥ 0.95	0.987	Good
CFI	≥ 0.95	0.988	Good

The results of data processing showed that all constructs were used to form a research model on the process of confirmatory factor analysis; Probability, RMSEA, GFI, AGFI, CMIN/ DF, TLI and CFI have fulfilled the predetermined goodness of fit criteria. GFI and AGFI are under the cut off - value, but are still within tolerable margins or often called marginal.

#### g. Test Results

Testing of the effect of project performance on cost performance and road maintenance time performance is conducted by observing the probability (p) of estimation result of regression weights model of structural equation. If the p value is less than 0.05 then the hypothesis is accepted.

**TABLE 4: ESTIMATION OF REGRESSION WEIGHTS OF STRUCTURAL EQUATION MODEL – INFLUENCE OF PROJECT PERFORMANCE TO COST AND TIME PERFORMANCE**

		Estimate Standardized	S.E.	P
Project Performance	Time Performance	0.218	0.12	0.041
Project Performance	Cost Performance	0.764	0.121	0.000
Time Performance	Cost Performance	0.798	0.138	0.000

1) The Effect of Project Performance on Time Performance  
Based on the results of the data, it showed that the project performance has a positive and significant effect on the time performance at  $\alpha = 5\%$  ( $p = 0.041$ ) with the coefficient of 0.218, it can be stated that a better project performance can make the time intensity increase.

2) The Effect of Project Performance on Cost Performance  
Based on hypothesis test result,  $\alpha = 5\%$  ( $p = 0.000$ ) with coefficient of 0.764. It showed that the influence of the five dimensions value is not much different, which means that all the dimensions have the same effect on the performance of

the project.

3) The Effect of Time Performance on Cost Performance  
The result of hypothesis testing proved that there is positive and significant relationship between time and cost at 5% ( $p = 0.000$ ) with coefficient of 0.798. It means that the longer the settlement time, the higher the cost incurred.

## 4 CONCLUSIONS AND RECOMMENDATIONS

### 4.1 Conclusions

- Project performance has a positive and significant effect on the time of the road maintenance project with coefficient of 0.218; it means that if the project performance increases, it will increase the time intensity of the road maintenance project.
- Project performance has a positive and significant effect on the cost of the road maintenance project with coefficient of 0.764; it means that if the project performance increases, it will increase the cost of road maintenance projects.
- Time performance has a positive and significant effect on the cost of the road improvement project with coefficient of 0.798; it means that if the time of the road maintenance project increases then the project will increase the cost.

### 4.2 Recommendations

Project performance has a positive and significant effect on the time of the road maintenance project with coefficient of 0.218; it means that if the project performance increases

- Descriptive analysis of respondents' perception showed that there are differences of respondent perception on human resource quality. It shall be consequences for the management to be more familiar with human resources. Because experienced human resources usually have more demands.
- The project managers need to pay attention to the performance of the project, especially in terms of quality of human resources and offering service providers; from the results of research, it has a quite influential value.
- The future researchers are expected to be able to improve the value of assumption test of SEM: it is multivariate value that has not been normally distributed, by using wider respondents and many other research objects.

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