STUDY OF SUPERVISION CONSULTANT COMPETENCY ROLE ON 'TIME PERFORMANCE' IN TOLL ROAD PROJECT CONSTRUCTION STAGE (CISUMDAWU TOLL ROAD PROJECT CASE STUDY)

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Toll Road Development in Indonesia is currently a priority in infrastructures development. The supervision consultant is part of the project's organizational structure in carrying out the toll road construction work.

This study aims to: identify the role of supervision consultant in implementing toll road project construction and time performance indicators of toll road project construction (Cisumdawu toll road). The problems of this research are: (1) What is the competency of supervision consultants in the implementation of toll road construction work?; (2) What is the effect of the competency of the supervision consultant on the time performance of toll road project construction at the implementation stage? (3) What are the recommendations for improvement obtained from this study? Limitation of this study: (1) focused on the role of technical supervision work competence at the stage of construction implementation in the construction time performance; (2) Research conducted on the process of implementing the Cisumdawu toll road construction; (3) In order to obtain representative interview results, the research respondents are from the project owner. The objectives of this study are (1) to identify the role of the competence of supervisor consultants at the construction stage; (2) knowing the value of effect the competency of supervision consultants to the construction time performance; (3) recommendations for improvement on the role of supervision consultant competence in toll road construction project. The analysis method used is the multiple regression analysis of the Step Wise Analysis model. The number of samples used was 45 respondents from owner of the toll road project.

From the discussion it can be concluded that the value of F analyzed > F table that is 77,183> 3.22 which means the competency of supervision consultants affects to the time performance of the toll road construction works.

Keywords: compentency, supervision consultant, time performance, toll road construction

1. Introduction

Supervision Consultants as part of the organizational structure construction implementation work has an important role in the success of a construction project implementation. In this study in particular the role of competency of supervision consultant in the implementation of toll road construction projects.

The main duties of the supervision consultant in toll road construction are as follows: (1) Carry out general administration in the management of the implementation of contract documents. (2) Carry out regular supervision in the progress of the project construction. (3) Publish reports on the achievements of construction work.

The project's organizational structure is one of the important things to manage the coordination, determaine the position and relationship of the parties involved in carried out the construction project.
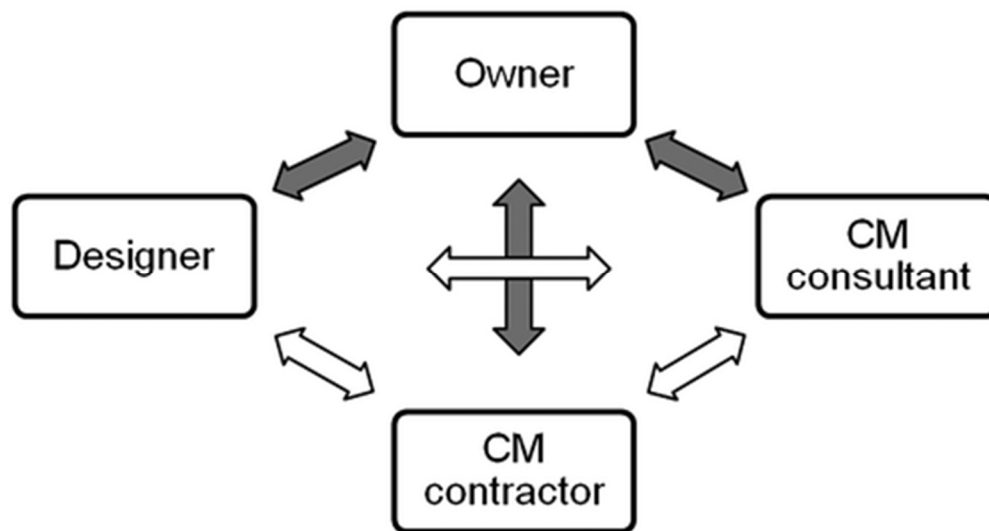

Figure 1. Relationship of the Parties

Basically, according to the characteristics of construction projects (infrastructure and buildings) confined with various risks of design change, the initial design/detailed engginering design of a construction project is almost impossible to be identical to the outcomes/product of the work in the field. Changes to the initial design can occur as a caused of the legal process, technical reasons, practicality, field conditions, financial condition, implementation methods or some changes from the project owner. The involvement of the supervision consultants at the construction stage has an important role in the 'performance' of construction projects following to the applicable regulations and in accordance with planning principles, contract documents and the expectations of the project user (owner). However, it would be very risky if the supervision consultants played a minimum role in the implementation of construction works, which might result in potential time delays, cost overruns and quality that was not in accordance with established / agreed specifications.

Problems in the research: (1) What is the role of the competency of supervision consultants in toll road construction works? and (2) What are the construction performance indicators of the toll road project at the implementation stage? (3) What are the recommendations for improvement obtained

from this study? Limitation of problems in this study are: (1) Focused on the role of technical supervision work competence at the stage of construction implementation in the construction time performance; (2) Research conducted on the process of implementing the 'Cisumdawu' Indonesia toll road construction; (3) In order to obtain representative interview results, the research respondents are from the project owner.

Research Objectives: (1) to identify the role of the competence of supervision consultants at the construction stage; (2) Knowing the influence/effect of the competency factors of supervision consultants to the construction 'time performance'; (3) Recommendations for improvement on the role of supervision consultant competence in the toll road construction project.

Research Model:
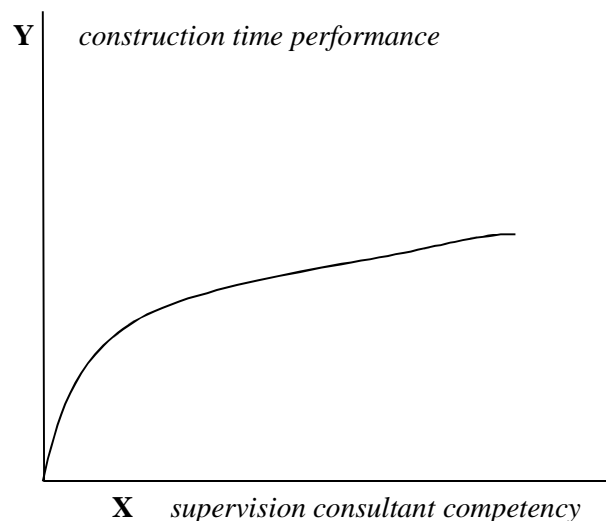
2. Literature Study

2.1. Toll Road Construction

Road / toll road construction is categorized as a complecated construction work in the classification [2]. So that a determined planning is needed that is useful for the development, both design and planning, organization, time, cost and so on. So that science is needed in terms of mutually sustainable and corresponding to the regulation or management in the world of highway / toll road construction projects.

2.2. Supervision Competencies

Spencer and Spencer (1993) [3], stated that competence is a characteristic that exists in someone who is interconnected with the criteria associated with high effectiveness and performance in a particular job or situation. The basis of competence is to compare the competence of a personnel at the time with the competencies required for a job, because the assessment of the role of competence depends on the accuracy of the competency measurement of construction project supervisors and the accuracy of defining competency variables (i.e. the most important competency required by a construction supervisor in order to carry out their duties properly)

The concept of supervision is basically to realize and improve efficiency, effectiveness & rationality in achieving goals to stop deviations, waste, prevent the reoccurrence of misconduct and find better ways to achieve goals. Criteria that need to be considered in the implementation of *supervision*, are: a) Objective in about the implementation of the actual work; b) Oversight is guided by applicable policies; c) Preventive, preventing as early as possible the occurrence of mistakes; d) Efficient, not hamper the implementation of work [4].

Transportation infrastructure construction works Supervision Services according to Ministerial Regulation [5] are classified as Engineering Supervision with code RE202: Technical assistance services and advice during the construction phase of transportation infrastructure construction such as roads, bridges, highways and so on is to ensure that construction works are being implemented in accordance with the final design. Includes services provided in offices and in the field such as shop drawings assessments, periodic field visits to measure the progress and quality of work, provide guidance to clients / owners and contractors in interpreting contract documents and other technical advice during the construction process of transportation infrastructure.

Scope of Supervision: quality control, control of the quantity of work and supervision of construction implementation methods [6]. Obligations of supervision consultants during the Construction Period: (1) To control the implementation of civil works carried out by the contractor so that they are having the right quality, right cost and on time by referring to the contract; (2) To encourage the contractor to fulfill his obligations in carrying out the work in accordance with the legal provisions in the contract documents.

2.3. Construction Performance

Performance refers to the level of success in carrying out the task and the ability to achieve predetermined goals [3]. Construction performance in this study is; how to carry out the construction work by comparing the actual outcomes with the work methods-plan of construction in estimated workings time period on the contract document agreed by the relevant parties (owner, supervision consultant, contractor).

2.4. The Role of the Supervising Consultant

The role of the supervision consultant in this case is consultan team competence, referring to the 'Indonesian National Work Competency Standards (SKKNI)', competency is the formulation of work capabilities which includes aspects of knowledge, skills and / or expertise as well as work attitudes that are relevant to the provisions of the applicable laws and regulations. Based on the references relating to the competency standards required by the supervision consultant team, of course it affects the construction work process, especially at the implementation stage.

3. Research Methodology

In this study, the description of the research methodology used is; 1) Research Process, explaining data sources and grouping of main activities (factors) and determining the variables; 2) Explanation of research instruments (primary data; research experts and respondents); 3) Explanation of research respondents' experts; 4) Explanation of research methods and research flow; Risk analysis method; Primary data analysis and Statistical analysis as well as model trial results assisted by SPSS (Statistical Package for the Social Sciences) software application. 5) Explanation of the research discussion method, namely the first analysis to get the grouping of data on the main activities

(factors), the second analysis to find out (variables), the third analysis that aims to obtain (the dominant variable) that influences on the main activities (factors), and the fourth analysis recommendations to the parties related to the implementation of the project under study.

Indicators and variables of supervision consultant competency can be seen in the following table.

INDICATOR	FACTOR	VARIABLE (X)
1. Competence	Understanding Contract Documents	1. Study te contract documents 2. Study the attachment of contract documents (pictures and others)
	Conduct initial construction / PCM meetings	3. Evaluate plans and work schedules according to the contract documents 4. Agree on the procedures for administering project elements
	Conduct survey of existing site conditions	5. Conduct joint surveys (consultants, contractors and owners)
	Examining the readiness of the constructor in the implementation of work	6. Receiving and checking the proposed request / permit to carry out the work and its supporting procedures including the readiness of the contract regarding resources (tools, materials and labor)
	Supervise the application of work methods of each activity	7. Supervise the implementation of work methods and the implementation of OSH of road works 8. Supervise the controlling environmental pollution and safety as well as traffic control of the construction work environment
	Conducting weekly and non-scheduled coordination meetings	9. Conduct weekly internal meetings and meetings with other institutions (special meetings) 10. Documentating the minutes of meeting and follow up the results
	Carry out quality control, dimensions, costs and time	11. Perform quality control, dimensions, costs and time 12. Documenting the procedures, results of quality control, dimensions, costs and time
	Take joint measurements for payments	13. Apply the procedures for measuring the volume of work progress and procedures of payment calculation

INDICATOR	FACTOR	VARIABLE (X)
		14. Accept or reject and approve the calculation of the volume of workers/labors for payment
	Making a payment certificate	15. Monitoring of method of payments, retention deductions, advance payment, material on the side, tax penalties, escaltaion calculation 16. Minimize environmental hazard
	Evaluating contractor work performance, reporting and handing over	17. Conduct the performance appraisal of the implementation of work, maintenance (period) programs and maintenance supervision 18. Making (PHO) and (FHO) reports and recommendation
2. Knowledge	Having the required knowledge (as construction supervision consultant)	19. Contract Documents 20. Field Engineering 21. Road Specifications 22. Methods for Implementing Road Works 23. Calculation of road construction costs 24. Controlling quality, costs and time 25. Measurement of work results 26. Project administration (engineering, general and finance)
3. Skills	Having the required skills (as construction supervision consultant)	27. Supervise the contract document implementation procedures 28. Study and recommend on existing site condition and field engineering review 29. Supervise of the implementation of road works based on technical specifications 30. Supervise the readiness of the contractor in implementing the method of carrying out road works 31. Controlling costs, quality and time 32. Analysis and evaluation of construction cost calculations based on contract documents for site conditions during construction 33. Check and verify the results of calculating work costs for issuing certificates of payment 34. Implementing the project administration procedures
VARIABLE (Y)		35. Supervision consultant competency affects to the construction work time/progress performance

Table: Indicators and variables of Supervision Consultant Competence (used for the questionnaire)

Reference: Departemen Permukiman dan Prasarana Wilayah - Standar Kompetensi Kerja Nasional Indonesia (SKKNI), "Kepala Pengawas Pekerjaan Jalan/Jembatan", 2003.

4. Finding and Discussion

Based on the results of the preliminary study, it is known that the Cisumdawu toll road construction project is experiencing a 'deviation of progress' towards the schedule / time of the planned construction work. This is due to several things, among others are; the role of supervision consultant competence, procedures of the decision-making management process that require a certain amount of time, constrains on the land acquisition process, changes of the design (specifications, drawings and materials) and others.

To define the effect of the role of supervision consultant competence on the 'time performance' of toll road construction work, the competency variable is identified refer to the SKKNI indicators and analyzed.

A description of the results of data processing is obtained from the distribution of questionnaires during the conduct of the research and secondary data is collected in the form of reports on the implementation of construction work. The description of the research object is taken from the characteristics of the respondent, the measurement of the achievement of the implementation of the competency of the supervision consultant according to the task / authority at the construction implementation stage.

Furthermore, by using statistical analysis, it is obtained the value of the effect of the role of the supervision consultant on the time performance of the toll road construction work under study.

Based on the results of data processing and data analysis, it can be concluded that:

1. In the validation test, the value of corrected item-total correlation compared with the value of r table, with respondents 45, obtained r table value = 0.2940 obtained all items answered by respondents stated Valid because it has a value above the r table value.

2. In the correlation test, the variables (X) that have a correlation with the variable (Y) are X1 , X2, X3, X6, X7, X10, X14, X15, X16, X19, X20, X21, X23, X24, X28, X29, X30, X34.

3. Using the Kolmogorv Sminov normality test method with the basic concept of comparing data distribution tests (which will be tested for normality) with standard normal distributions, a significant value of 0.08 is obtained, this value> 0.05, so it can be concluded that the residual of research models are normally distributed, thus normality requirements are met.

4. Regression Analysis is a method used to measure the effect of independent variables (X) on the dependent variable (Y) and can also be used to predict the dependent variable using the independent variable. Based on the regression table above, there are 3 variables forming the regression model formed. The model forming variable I was formed by variable X28, X24, X13 with R2 (R square) value obtained from the model forming variable is 0.800, which means that the variable X28 in the model forming variable I contributed a change to Y by 80,0%. Model 4 forming variables are combined by variables X28, X24, X13 value obtained from the forming variables of the model is 0.850. Of the four forming variables of the model formed, the highest value of R2 is in the seven forming model of the variable, 0,850. This means that X28, X24, X13 can cause changes in Y by 85,0 % while the remaining 15% is influenced by outside variables not discussed and explained in this study.

Model Summary[d]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
					Change Statistics					
1	.895[a]	0,800	0,796	0,366	0,800	172,497	1	43	0,000	
2	.907[b]	0,822	0,814	0,349	0,022	5,159	1	42	0,028	
3	.922[c]	0,850	0,839	0,325	0,027	7,435	1	41	0,009	2,175

a. Predictors: (Constant), X28

b. Predictors: (Constant), X28, X24

c. Predictors: (Constant), X28, X24, X13

d. Dependent Variable: Y

Table: Summary Regression Analysis Model (Stepwise Method)

5. From the calculation results for the partial test analysis (t) can be seen from the table above, it is concluded that, in the regression test, the variables that have influence on the performance variable (with the value of t is higer than 2.01808) are X28, X24, X13 variables.

Coefficients[a]

Model	B	Std. Error	Beta	t	Sig.
	Unstandardized Coefficients		Standardized Coefficients		
1 (Constant)	0,302	0,317		0,952	0,346
X28	0,922	0,070	0,895	13,134	0,000
2 (Constant)	-0,706	0,537		-1,314	0,196
X28	0,889	0,069	0,863	12,971	0,000
X24	0,249	0,110	0,151	2,271	0,028
3 (Constant)	-0,526	0,504		-1,044	0,303
X28	0,895	0,064	0,869	14,012	0,000
X24	0,654	0,180	0,396	3,629	0,001
X13	-0,449	0,165	-0,297	-2,727	0,009

a. Dependent Variable: Y

Table: Partial Test

6. From the results of data processing using SPSS, it can be concluded that: the calculated F value is 77,183. By comparing the calculated F value with F table is 77,183 > 3.22. By comparing the F calculated with the F table, it can be seen that the forming variable has a total value that is greater than the F table value. Thus, it can be concluded using the simultaneous test, these variables together simultaneously have a significant effect on time performance.

Model		Sum of Squares	df	Mean Square	F	Sig.
ANOVA[a]						
1	Regression	23,053	1	23,053	172,497	.000[b]
	Residual	5,747	43	0,134		
	Total	28,800	44			
2	Regression	23,682	2	11,841	97,171	.000[c]
	Residual	5,118	42	0,122		
	Total	28,800	44			
3	Regression	24,468	3	8,156	77,183	.000[d]
	Residual	4,332	41	0,106		
	Total	28,800	44			

a. Dependent Variable: Y

b. Predictors: (Constant), X28

c. Predictors: (Constant), X28, X24

d. Predictors: (Constant), X28, X24, X13

Table ANOVA

5. Conclusions & Recommendation

1. The variables that most influence and contribute to time performance of the toll road construction are: X28, X24 and X13

X28 : Supervision consultants have skills to study and recommend on existing site condition and field engineering review.

X24 : Supervision consultants have knowledge of controlling quality, costs and time

X13 : Supervision consultants have competency to apply the procedures for measuring the volume of work progress and procedures of payment calculation

3. Multiple regression determined 15 % affected by other variables not analyzed in this study including such as constraints on land acquisition and time requirements to manage formal decision-making procedures.

4. F test analysis shows (X) variables simultaneously affect to the time performance of construction (Y) variables and it means hypothesis the role of supervision consultant competency affects the time performance of construction work can be accepted.

5. In order to achieve expected construction performance (time performance), a supervision consultant team competency role with the highest standard level of competency is required.

6. The selection of the supervision consultant team is carried out in accordance with the standards required in the SKKNI for competencies especially for the tasks to be assigned.

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