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Analysis of Factors Affecting the Cost Performance of Road Improvement Work in Serang Regency

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ABSTRACT

The Road Infrastructure Development Acceleration Program that has been launched by the Serang Regency Government in the 2017 fiscal year to the 2021 fiscal year, In the implementation of road improvement work in Serang Regency, a working length of 100 kilometers per year has been set for 5 budget years starting from the 2017-2021 fiscal year, the implementation of road improvement work in Serang Regency until the end of 2021 the remaining 20 kilometers due to changes in road length and increase in the volume of work in the field. This study analyzes the factors of additional costs incurred on road improvement work in Serang Regency by identifying the factors causing the cost increase from the largest to smallest factors data collection methods through questionnaires and interviews addressed to contractor personnel with validity, reliability and correlation tests used for data processing, while descriptive analysis is used for data analysis using Jeffreys Amazing Statistics Program (JASP) version 0.16.2 and Relative Importance Index (RII) are expected with this method to determine the factors causing additional costs in road improvement work. The highest level factor was identified as causing the additional cost of implementing Serang Regency road improvement work, namely Volume Changes (Technical Factors) with an RII index value of 0.715.

Keywords: project; road construction; factor analysis; cost addition; JAPS Version 0.16.2.

INTRODUCTION

Menutur (Priyo &; Sumanto, 2016) Time and cost greatly affect the success and failure of a project, project success standards are usually considered short turnaround times with minimal costs without reducing the quality of work. Systematic project management is needed so that the project implementation time is under the agreement or even faster so that the costs incurred can generate profits and also avoid fines due to late project completion.

Cost inflation in construction projects largely depends on some factors, both internal and external to the project. Therefore, it is necessary to analyze these factors to prevent cost overruns that result in losses in the implementation of construction projects (Sumadi, Wayan Edi, Wiranata &; Asmara, 2016).

In this paper, the author analyzes the factors of additional costs arising from road improvement project work in Serang Regency by identifying the causal factors and using questionnaire distribution methods and interviews to determine the largest and smallest factors that affect the increase in costs of work. The data collection method using questionnaires and interviews to implement contractors with validity, reliability, and correlation tests were used for data processing, while descriptive analysis was used for data analysis using Jeffreys Amazing Statistics Program (JASP) version 0.16.2.and Relative Importance Index (RII) is expected with this method can be known the factors causing additional costs in road improvement work.

RESEARCH METHODS

In this study, the identification of factors and causes of additional costs was carried out, development of a model of the relationship between variable X variables (environmental, technical, implementation methods, financial, socio-cultural) and variable Y (time performance and cost performance) and identified the most influential factors for delays and additional costs in road improvement projects in Serang Regency,

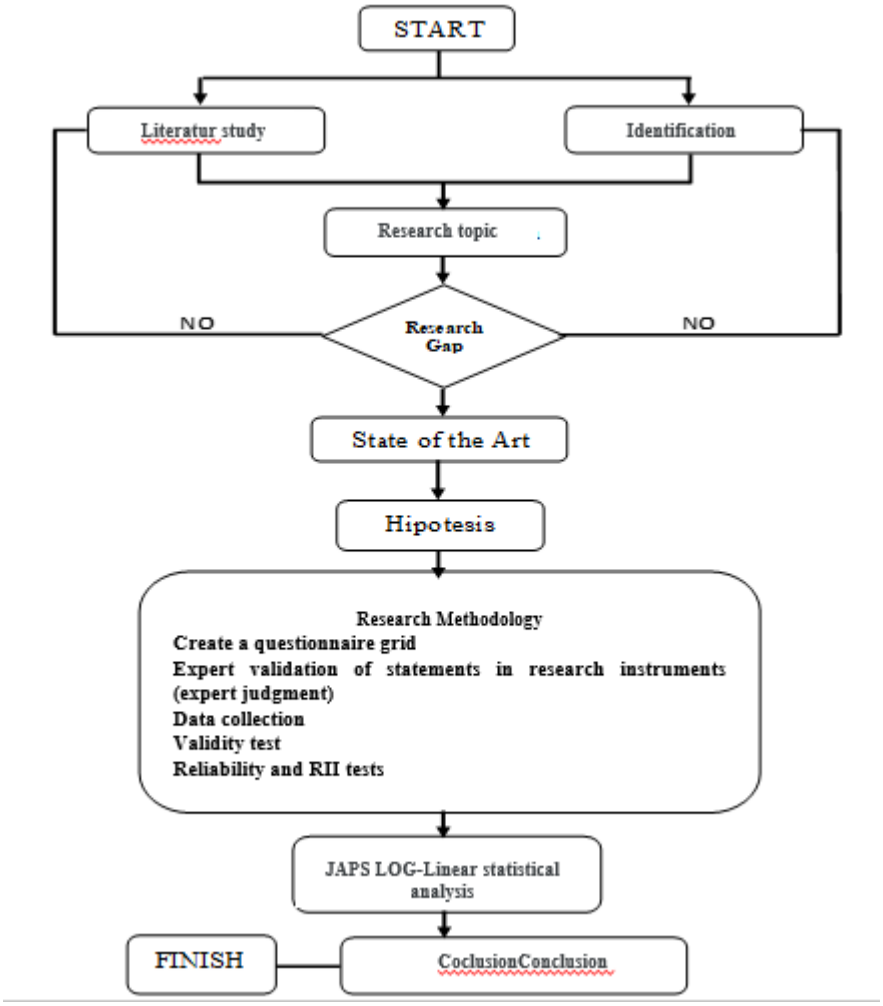

Figure 1. Flowchart

Operationalization of variables is needed to determine the types of variables and indicators included in this study. In addition, the purpose of variable work is to determine the measurement scale of each variable so that hypothesis testing with tools can be carried out properly. More about how variables work in this study can be seen in Table 1.

Table 1. Operational Definition of Variable X

Variable	Variable definition	Dimension		Indicators
ENVIRONMENT (X1)	Environment Is all objects and conditions that contain humans and their activities	Environmental Impact	X1.1	The occurrence of environmental impacts around the project
		Road Damage	X1.2	The occurrence of road damage due to work
		Security	X1.3	Project Environmental Safety
		Traffic	X1.4	The level of traffic density around the location
FINANCE (X2)	Finance is the management,	Term	X2.1	Late payment of terms

	creation, and study of money and investments	Supplier Payment	X2.2	Payment to subcontractor/supplier is late
		Operating Costs	X2.3	High operating costs
		Material Price	X2.4	Increase in the price of materials
IMPLEMENTATION METHOD (X3)	The Implementation Method is the application of the concept of engineering based on the employment contract	Quality	X3.1	Lack of planning and quality control
		Working Method	X3.2	Work method errors
		Material and Labor	X3.3	Delays in the delivery of materials and labor
		Occupational Health and Safety	X3.4	K3 planning and control
TECHNICAL (X4)	Technical is a rule/norm/requirement of a job	Design Completeness	X4.1	Incomplete design
		Design Changes	X4.2	Design changes occur
		Volume	X4.3	Volume mismatch
		Picture	X4.4	Image discrepancies
SOCIO-CULTURAL (X5)	Socio-Culture is an order and relationship in the community environment.	Social Inequality	X5.1	There is a Social gap around the project
		Worker	X5.2	Worker Culture
		Culture	X5.3	The traditional ceremony begins work
		Community Licensing	X5.3	Community Licensing on the implementation of work

(Source: author)

Methods of collecting data

The population in this study is all road improvement work in Serang Regency in 2020-2021 which experienced additional work costs. The sample number of plans is 40 people and respondents, site managers, project managers, and implementers are involved in Serang Regency road improvement projects. If the population is less than 100 people, then the total sample is taken as a whole, but if the population is more than 100 people can be taken 5-15% or 20-25% of the total population (Arikunto, 2016). In this study, because the population was less than 100 respondents, the author took 100% of the existing population, which was as many as 40 respondents. Thus, using the entire population without a research sample as a unit of observation.

Table 2. Respondent's Position

Position	Frequency	Percent	Valid Percent	Cumulative Percent
Project Manager	11	27.500	27.500	27.500
Site Manager	18	45.000	45.000	72.500
Executive	11	27.500	27.500	100.000
Missing	0	0.000		
Total	40	100.000		

(Source: author)

Table 3. Frequencies for Age

Umur	Frequency	Percent	Valid Percent	Cumulative Percent
20-30	5	12.500	12.500	12.500
31-40	26	65.000	65.000	77.500
41-50	8	20.000	20.000	97.500
>50	1	2.500	2.500	100.000
Missing	0	0.000		
Total	40	100.000		

(Source: author)

Data Analysis

The data analysis process uses a simulation tool, namely JAPS Version 0.16.2 (Jeffreys's Amazing Statistics Program) with the concept of a Linear Regression test and a test with the Relative Importance Index (RII) method by analyzing the results of questionnaires from experts to find dominant things from several variables that affect cost performance and can find out the development of relationship models between variable X (environmental factors, technical, implementation methods, financial, socio-cultural) and variable Y (cost performance).

RESULT AND DISCUSSION

Validity Test

Validity tests are used to measure how valid an instrument can uncover data from precisely studied variables. Testing the validity of each item is used item analysis, which correlates the score of each item with a total score (corrected item-total correlation) whose completion is assisted using the JAPS program Version 0.16.2

Table 4. Validity Test

Variable		X1	X2	X3	X4	X5	Y	VAR. Y
1. X1	n	—						
	Pearson's r	—						
	p-value	—						
2. X2	n	40	—					
	Pearson's r	0.730 ***	—					
	p-value	<.001	—					
3. X3	n	40	40	—				
	Pearson's r	0.512 ***	0.767 ***	—				
	p-value	<.001	<.001	—				
4. X4	n	40	40	40	—			
	Pearson's r	0.362 *	0.190	0.154	—			
	p-value	0.022	0.240	0.342	—			
5. X5	n	40	40	40	40	—		
	Pearson's r	0.731 ***	0.835 ***	0.770 ***	0.138	—		
	p-value	<.001	<.001	<.001	0.397	—		
6. Y	n	40	40	40	40	40	—	
	Pearson's r	0.500 **	0.435 **	0.229	0.235	0.345 *	—	
	p-value	0.001	0.005	0.156	0.145	0.029	—	
7. VAR. Y	n	40	40	40	40	40	40	—
	Pearson's r	0.844 ***	0.885 ***	0.774 ***	0.449 **	0.856 ***	0.643 ***	—
	p-value	<.001	<.001	<.001	0.004	<.001	<.001	—

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Table 4. Validity Test

Variable	X1	X2	X3	X4	X5	Y	VAR. Y

* p <.05, ** p <.01, *** p <.001
(Source: author)

Reliability Test

Data reliability tests determine whether a data collection tool demonstrates fundamental accuracy, precision, stability, or consistency. A reliable instrument provides the same data when used to measure the same item multiple times, with a Cronbach alpha value greater than 0.6 (as the general standard of reliability of research instruments). In general, the reliability of a research instrument between > 0.60 to 0.80 can be said to be good, if between > 0.80 to 1.00 is considered very good.

Table 5. Reliability Test

	If item dropped	
Item	**Cronbach's α**	**sd**
X1.1	0.936	0.672
X1.2	0.932	0.716
X1.3	0.936	0.925
X1.4	0.937	0.630
X2.1	0.936	0.580
X2.2	0.930	0.984
X2.3	0.932	0.797
X2.4	0.935	0.870
X3.1	0.934	0.770
X3.2	0.929	0.982
X3.3	0.929	0.982
X3.4	0.939	0.716
X4.1	0.939	0.781
X4.2	0.941	0.905
X4.3	0.940	0.791
X4.4	0.938	0.636
X5.1	0.931	0.764
X5.2	0.931	0.859
X5.3	0.931	0.893
X5.4	0.932	0.853

(Source: author)

R Square

The Output Model Summary explains that the magnitude of the correlation value/relationship R is 0.973. From the output, the coefficient determinant (R square) is 0.946, which contains the understanding that the influence of variable X (environmental, technical, implementation methods, financial, socio-cultural) and variable Y (Cost Performance) is 97.3%, the calculation results can be seen in Table 6

Table 6. R Square

Model	R	R^2	Adjusted R^2	RMSE	R^2 Change	F Change	df1	df2	p
H_0	0.000	0.000	0.000	12.965	0.000	0	39		
H_1	0.973	0.946	0.938	3.233	0.946	118.652	5	34	<.001

(Source: author)

T Test

T-statistics is a value used to see the level of significance in hypothesis testing by finding the value of T-statistics through bootstrapping procedures. In hypothesis testing, it can be said to be significant

when the value of T-statistics is greater than 1.96, while if the value of T-statistics is less than 1.96 it is considered insignificant (Ghozali, 2016)

Table 7. T test

Model		Unstandardized	Standard Error	Standardized	t	p	Collinearity Statistics	
							Tolerance	VIF
H_0	(Intercept)	65.455	2.098		31.199	<.001		
H_1	(Intercept)	0.826	1.044		0.791	0.441		
	X1	1.144	0.186	0.262	6.151	<.001	0.121	8.294
	X2	1.474	0.152	0.276	9.686	<.001	0.269	3.715
	X3	0.975	0.131	0.167	7.466	<.001	0.438	2.283
	X4	1.018	0.093	0.223	10.919	<.001	0.522	1.915
	X5	1.281	0.195	0.226	6.575	<.001	0.185	5.410

Analisis Relative Importance Index (RII)

Relative Importance Index (RII) is an analysis that allows a quantitative relative, where the higher the rating (rating) the higher the influence exerted. Analysis is used to conduct an analysis of various factors affecting the productivity of workers in construction related to the implementation of the project. The score for each factor is obtained through the summation of respondents' answer scores (Junaidi et al. 2014).

Table 8. RII Calculation Analysis Causes Cost Addition

No	Main Factors	Sub Factors	Recapitulation of Questionnaire Results					Sum	W	A	N	RII Index Value	Sub Factor Ranking
			1	2	3	4	5						
1	Milieu	X1.1	0	3	19	17	1	40	136	5	40	0.680	3
2		X1.2	0	4	23	11	2	40	131	5	40	0.655	7
3	Finance	X2.3	0	6	17	15	2	40	133	5	40	0.665	6
4		X2.4	0	8	17	12	3	40	130	5	40	0.650	8
5	Implementation Method	X3.1	0	7	22	9	2	40	126	5	40	0.630	10
6		X3.2	0	7	17	9	7	40	136	5	40	0.680	4
7	Technical	X4.3	0	3	19	10	8	40	125	5	40	0.715	1
8		X4.4	0	4	26	9	1	40	127	5	40	0.635	9
9	Socio-Cultural	X5.3	0	6	19	10	5	40	134	5	40	0.670	5
10		X5.4	0	5	16	14	5	40	148	5	40	0.695	2

(Source: author)

Table 8. Results of RII Calculation Analysis Based on Factor Ranking

Causes of Cost Addition

Rank	The Highest Sub Factor Causes Cost Addition

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1	Volume Changes
2	Job Location Culture
3	Environmental Impact
4	Working Method
5	Worker Culture
6	Operating Costs
7	Road Damage
8	Material Price
9	Working Drawing
10	Bahan Material

(Source: author)

CONCLUSION

Factors that affect cost performance on road improvement work in Serang Regency according to the highest to lowest levels cause additional costs for implementing road improvement projects, namely the Volume Change sub-factor with a RII value of 0.715, Work Location Culture with a value of 0.695, Environmental Impact with a value of 0.680, Work Method with a value of 0.680, Operating Costs with a value of 0.665, Road Damage with a value of 0.655, Price of Materials Materials with a value of 0.650, Working Drawings with a value of 0.635 and Dub the lowest factor which is the Sub-factor of Quality of Work with a value of 0.630

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