

# International Journal of Innovative Research in Science, Engineering and Technology

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## Project Financing Management Analysis in Improving Cost Performance in Road and Bridge Infrastructure Projects

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**ABSTRACT:** In a construction project, a cost plan is one of the most important resources for the project development guide. It should be essential for cost plan through a cost estimated schedule for each of the cost needed in terms of time of project implementation. This research focused only on road and bridge infrastructure projects in Aceh, North Sumatra, West Sumatra and Riau. Project cost management is an effort on construction for an efficient and effective construction project. Effective is the results of resources usage and activities by the goals roomates involve; quality, cost, time and others. Means a decent and efficient usage of resources and the application of operating methods. Thus, the cost of project management in a construction project is a topic that can not be neglected Because, without project management, the construction will be hard as a planned, over cost, time and quality. This research is to examine the influence of the cost of project management for improving cost performance. The Research method used is a qualitative method of data analysis using secondary. By this research, will give a positive guidance for contractors to create the best cost project. The impact of this research will give a real reference for the easing process of the road and bridge construction.

**KEYWORDS:** Management, Project Cost, Road, Bridge, Construction, Efficient

### I. INTRODUCTION

On Presidential Regulation 122 in 2016, the government is managing a program of priority infrastructure that has a significant influence on the economy both in central and local levels. One of the public road infrastructures includes roads, highways, bridges and bridge tolls. In a construction project, the cost is crucial because it can be a measure the success of a project. Cost control of construction is one of the most important charges in the construction management. Project Management Institute (1996) explains the factors that affect the project cost management, is resource planning, cost estimating, cost budgeting and cost control. The factor will adjust to be a variable and get results of the project cost management influence for improving the cost performance of road and bridge infrastructure projects. Moreover, this research will be analyzing the project cost management in improving the cost performance of road and bridge infrastructure projects.

This research assessed as a reference for a thesis with the ultimate goal of generating recommendations of management methods used in cost management to improve the cost performance, where boundaries of research are road and bridge infrastructure. Boundaries of research areas are road and bridge infrastructure projects in Aceh, Riau, West Sumatra and North Sumatra. The performance of construction project is how to achieve the project work by comparing the results of real work to estimate working on the job contract that approved by the assignor and the assignee. In the project cost management, there are factors that influence it:

#### 1. Resources Planning

Including a wide range of resource requirement plan (especially material, human resources, costs, etc.) based on work activity within a project. This process is related to the cost estimation process.

#### 2. Cost Estimating that involve a quantitative calculation of the costs that occur to complete the project.

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3. Cost Budgeting, its got from the cost baseline which to judge the project performance. In cost budgeting, which must be considered include:
  - Project scope statement
  - WBS and explanations
  - Estimated cost of activities and supporting details
  - The project schedule
  - Resource calendar
  - Contract: related to any product or result has been purchased and cost detailed
4. Cost control, its includes monitoring of cost performance, the appropriate changes are included in the revised baseline cost and informed to stakeholders that the change will influence in cost changes.

## II. RESEARCH METHODOLOGY

The methodology used in this research using four factors: resource planning, cost estimating, cost budgeting and cost control. Data obtained through the results of questionnaires by respondents who work in construction of roads and bridges. The research question is:

1. How did portrait road and bridge infrastructure projects in the province of Aceh, Riau, West Sumatra and North Sumatra?
2. What are the factors and variables of project cost management?
3. How to measure the cost performance on road and bridge infrastructure projects?
4. How the results of influence analysis of the project cost management for improving the cost performance?
5. Which recommendations could be formed by this research?

## III. ANALYSIS AND RESULTS

### Variables Used in This Research

In this research, 4 factors are gathered from several literature with each factor consist as the following variables

Table 1 Factors and Variables Research

Factor	variables
Planning Resources	1. Condition of Access Locations
	2. Material changes
	3. Availability of human resources
	4. Skills and labor productivity
	5. HR work can coordinate well
	6. Good Skills of HR
	7. Lack of material
	8. The scarcity of material
	9. Climate
	10. Conflict between Labor
	11. The workers' strike
	12. Uncertainty field conditions
	13. The security Disorders
	14. Traffic congestion
	15. The lack of labor discipline
	16. The lack of supervision in the field
Estimated	17. Planning project costs

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**Vol. 7, Issue 5, May 2018**

costs	18. The project schedule
	19. Delay in delivery Tools
	20. Lack of Equipment
	21. Use of an advance contract
	22. Ability Equipment
	23. The method of implementation of the corresponding
	24. Estimator behaviour of estimating costs
	25. The increase of material prices on the market
	26. Design changes (Addendum) of new work items
	27. Ability Contractors
	28. Delayed information from planners
	29. The design data is incomplete
	30. Material damage during shipment
	31. Change order
	32. Damage to the tool during storage
	33. Quality (quality) work less well
34. The method of execution is wrong	
35. Delay of troubleshooting	
36. Not available tools as needed	
Budgeting Cost	37. The curve S
	38. Budget Basics
	39. Delay of work implementation
	40. Design changes
	41. Unfulfillment of initial planning in the design owner
	42. Financial Failure owner
	43. Addition of equipment rental fees
	44. The high cost of maintenance tools
	45. The poor quality of material
	46. Productivity and efficiency of material
	47. Conditions unsuitable equipment
	48. The process of request and approval of working drawings by owner
	49. The lack of accuracy design requires design review
	50. The delay in the request for payment by contractors
Cost control	51. Changes in budget

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Vol. 7, Issue 5, May 2018

52. Addition costs
53. Waiting of testing results by owner
54. Payment mechanism by the owner
55. Late payments from the contractor to workers
56. Late payments from the contractor to the supplier
57. Communications Problems
58. Coordination problems
59. The number of real jobs
60. Changes in government regulations
61. Government policy that led to the cessation of the project
62. Complicating the matter of licensing
63. The existence of demand changes in work already completed
64. Implementation in the field does not match SOP
65. Remoteness material disposal site project
66. Scheduling is less good than the owner (the time provided too fast)
67. The delay in making the report and administrative jobs

In this research study will research using SPSS and qualitative method. Primary data in this study were obtained directly from the respondents by spreading the question or questionnaire with multiple choice type questions. The reasons for the use of questionnaires as a data collection tool in this study are as follows:

1. The interpretation of the subject to the question posed to respondents is consistent with the intent of researchers.
2. In answering the questions, respondents could more freely because it is not influenced by the relationship between the mental attitudes of respondents to the researchers.
3. The collected data can be easily analyzed. Each submission will be given the scale of values according to selection criteria answers using a Likert scale.

Analysis of the data is the data processing activities after the data are collected and ready to be served in the form of writing or as a research report. The method of data analysis used in this study are:

Quantitative analysis

Used to analyze the data obtained from the figures. Quantitative analysis process is carried out in the following stages:

- a. Editing,
- b. Scoring
- c. Tabulating

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Vol. 7, Issue 5, May 2018

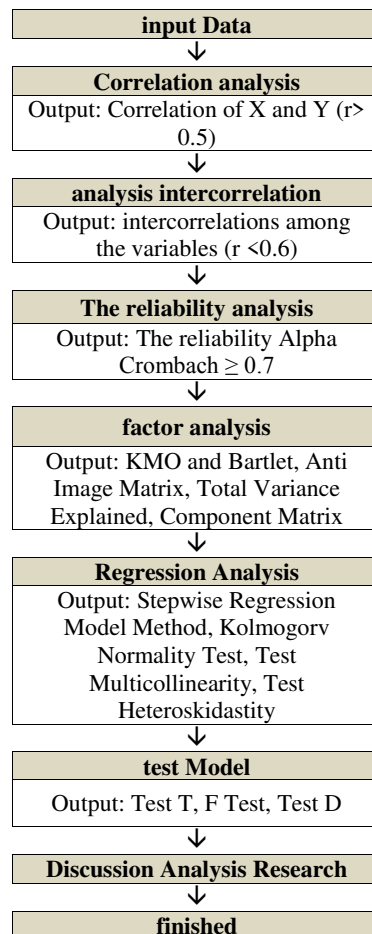


Figure 1 Flow Statistics with SPSS

## Respondents Data Collection

This stage is the stage of collecting data from the questionnaire that was answered by respondents who have been determined, then will diolah with SPSS. Results of filling the questionnaire generate as much data as 61 respondents working in the field of construction, such as state-owned enterprises and private contractors. Characteristics of respondents in this study can be seen in terms of:

1. Gender Respondents :Most respondents male sex as much as 98.36%, while the remaining 1.64% are female.
2. Education :Most respondents educated S1 (85.25%), while the remaining 9.84% of respondents educated S2, D3 educated as much as 3.28% and as much as 1.64% of the respondents had high school education ..
3. Years of workin:Most respondents have been working for 5-10 years (50.82%), while the remaining 24.59% have worked 11-20 years, as much as 13.11% working <5 years and as much as 11.48% of respondents worked > 20 year.
4. Position:Based on the results of questionnaires, as much as 36.07% working as an Engineer, 31.15% as Site Manager, 24.59% as Project Manager, and 8:20% as a Senior Manager.

## Data Processing

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Visit: [www.ijirset.com](http://www.ijirset.com)

Vol. 7, Issue 5, May 2018

In analyzing the problem using qualitative descriptive analysis, so that there are four important factors in the study are Factors Resource Planning, Estimated Cost Factor, Factors Budget, Factors Cost Control. These are 4 factors consisting of 67 independent variables and one dependent variable analysis will be done in the form of The reliability analysis, correlation analysis, intercorrelation Analysis, Factor Analysis and Regression Analysis with SPSS version 25.

### Correlation analysis

In this study the correlation analysis is used Product Moment Correlation analysis because the data used in this study is numerical. The independent variable has a value of correlation  $r \geq 0.4$ . The independent variables that passed briefly correlation can be seen in Table 2 below:

Table 2 Variable Correlation Analysis Results

variable X	Information	R Count
X1	Location Access Conditions	0.502
X2	Material changes	0.562
X3	The availability of human resources	0.626
X4	Skills and labor productivity	.660
X5	HR work can coordinate well	0.578
X7	Lack of material	0.700
X8	scarcity of material	.631
X11	Workers strike	0,523
X12	Uncertainty field conditions	0.617
X13	security breach	.545
X14	Traffic congestion	.572
X15	The lack of labor discipline	.557
X16	The lack of supervision in the field	0,629
X17	Planning project costs	.603
X18	The project schedule	.546
x19	Delays in delivery of equipment	0.592
X20	Equipment shortages	0.565
X25	Material price increase in the market	0.547
X26	Design changes (Addendum) new work items	0.541
X27	ability Contractors	.542
X28	Late information from planners	.609
X29	Design data is incomplete	0.578
x33	Quality (quality) work less well	0,625
X34	Incorrect execution method	0,532
X35	Delay troubleshooting	.596
x36	Not available tools as needed	0,509
X38	Budget Basics	0,548
X39	Delays in work	.570
X40	Design Changes	0.555
X41	Non-fulfillment of initial planning in the design owner	.539
X43	Extra equipment rental fees	0.511
X49	Inaccuracies design requires design review	0.608
X51	Changes of budget	.628
X55	Late payments from the contractor to	0.524

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Vol. 7, Issue 5, May 2018

	workers	
X57	communication problems	0.575
X58	coordination problems	0.505
X59	Total real job	0,548
X61	Government policies that cause the cessation of the project	.570
X62	Complicating the matter of licensing	0,509
X64	Implementation on the ground does not match SOP	0.573
X66	Poor scheduling of the owner (the time provided too fast)	.653

Based on the result of intercorrelation analysis (correlation values > 0.6) can be seen from the 41 independent variables analyzed, only the remaining 9 variables that pass the test of intercorrelation. The variables are X1, X2, X3, X11, X12, X18, X19, X51, X57 that will proceed to the next analysis.

Factor analysis test conducted to establish some set of independent variables selected from the results of correlation and intercorrelation. Criteria of data that can be analyzed is data indicating factors  $KMO > 0,5$  and Bartlett's test of significant Sphericity at  $< 0.05$ . The following is a table of 3 KMO-MSA results of the factor analysis:

Table 3 KMO and Bartlet Factor Analysis Results

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.854
Bartlett's Test of Sphericity	Approx. Chi-Square	222.768
	df	36
	Sig.	.000

Based on Table 3 above, the value KMO results of the factor analysis was 0.854, KMO value gained more than 0.5, this means that the factor analysis can be performed. Significant value gained from Bartlett test is 0,000 and this value is less than 0.05, which means there is a significant relationship between independent variables both inside and outside factors.

### Linear Regression Analysis

The method used in this regression is a stepwise method, in which all independent variables analyzed are filtered so as to get the independent variables are actually able to explain the dependent variable. With SPSS, the following are the results of the regression analysis using stepwise method:

Table 4 Regression Analysis

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0,628a	0394	0384	0678	
2	0,757b	0573	0558	0574	
3	0,800c	0640	0621	0531	
4	0,820d	0672	0648	0512	2,220

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Vol. 7, Issue 5, May 2018

- a. Predictors: (Constant), X51
- b. Predictors: (Constant), X51, X3
- c. Predictors: (Constant), X51, X3, x19
- d. Predictors: (Constant), X51, X3, x19, X12
- e. Dependent Variable: Y

According to the table above, the amount of regression model formed is 4, the predictor variables, ie variables, which means that the variable X51 X51 (Budget Amendment) contributes to the performance fee on road and bridge infrastructure projects amounted to 39.4%, while the X3 for 17.9%, x19 X12 6.7% and 3.2%, which is obtained from each increment factor. Variable X51, X3, x19 and X12 is able to explain the change in Y (performance fees) amounted to 67.2% while the remaining 32,% explained outside of these variables, so that in subsequent analysis.

### Regression equations

The regression equation can be formed from the table of coefficients obtained from a linear regression analysis regression models were established. Here is a table of coefficients are formed from the multiple regression analysis with SPSS:

Table 17 Table Regression Analysis

Coefficients <sup>a</sup>					
Model		Coefficients unstandardized		t	Sig.
		B	Std. Error		
1	(Constant)	1,296	0492	2,635	0011
	X51	0723	0117	6192	0000
2	(Constant)	0398	0455	0876	0385
	X51	0527	0107	4946	0000
	X3	0431	0088	4926	0000
3	(Constant)	-0068	0444	-0154	0878
	X51	0452	0101	4,466	0000
	X3	0328	0087	3774	0000
	x19	0302	0092	3273	0002
4	(Constant)	-0167	0430	-0387	0700
	X51	0388	0101	3,821	0000
	X3	0235	0093	2526	0014
	x19	0282	0089	3,165	0003
	X12	0211	0091	2,324	0024
a. Dependent Variable: Y					

According to the table 17 above, the regression equation between the variables X51, X3, x19 and X12 with Y as follows:

$$Y = - 0.167 + 0.388 + 0.235 X3 X51 + 0,282 + 0,211 x19 X12$$

by:

- Y = Performance fees
- X51 = Change of budget
- X3 = Availability of human resources
- x19 = Delay delivery tool



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Vol. 7, Issue 5, May 2018

X12 = Uncertainty field conditions

## IV. CONCLUSION

Project finance management factors are factors that can be inferred resource planning, cost estimating factors, factors budget and cost control factor. To improve the cost performance on road and bridge infrastructure projects that must be considered is the change in the budget (X51), the availability of human resources (X3), delays in the delivery charge (x19) and uncertainty in the field (X12). Recommendations that can be used to increase the cost performance on infrastructure projects of roads and bridges that can be deduced from the four variables are planning budget to include unexpected expenses into the budget, the implementation of the work in the field must also attach to detail the amount of human resources required, minimizing delivery delay problem by hiring tool tool long ago before the time of execution in the field, and the contractor must be able to think about how to uncertainty in the field can be controlled though a bit but have a major impact on the progress of work culminate in the performance of the project cost. This research is very necessary to continue with the approach of other studies such as: Research using the perception of the other party in road and bridge infrastructure projects, in relation to the performance fee, Objects infrastructure projects other than roads and bridges

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