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Analysis Of Effect Of Human Resources, Allocation Of Funds, Materials, and Construction Equipment On Performance Of Road Maintenance In Jepara Regency

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Abstract - The availability of adequate facilities and road infrastructure is one indicator of community welfare. Jepara Regency Government through road maintenance program trying to keep the road condition to stay steady. Human resources, allocation of funds, materials, and construction equipment are the main factors determining road maintenance performance. This study aims to identify and analyze these factors so that it can be known the effect on road maintenance performance in Jepara regency. The results of the analysis conducted on the sample of respondents totaling 90 people showed that: 1) Human resources, allocation of funds, materials, and construction equipment respectively partially have a positive and significant impact on road maintenance performance; 2) Human resources, allocation of funds, materials, and construction equipment simultaneously have a positive and significant impact on road maintenance performance.

Keywords: *human resources, allocation of funds, materials, equipment, maintenance*

1. Introduction

Economic growth in Jepara regency has consequences of increasing mobility of both goods and people which resulted in increased loads by traffic flows primarily due to overloading on road pavements that cause structural or functional degradation. One of the most important activities to maintain the condition is road maintenance. Appropriate road maintenance pattern needs to be done to see the development of traffic flow, climate, environment and local government policy to make changes in road conditions are very volatile. According to the Government Regulation of the Republic of Indonesia Number 34 Year 2006 concerning the First Section of Article 57 paragraph (1), explains that the authority of road operation exists on the government and local government. Jepara Regency Government through Public Works and Spatial Planning Department of Jepara Regency (called DPUPR of Jepara Regency) is the authorized service in organizing regency road in Jepara regency.

Maintenance of roads in Jepara regency until now has not been able to say good, it is because the lack of attention of local governments in road maintenance. so that in some roads in Jepara district is still damaged. The still low quality seen from the condition of roads in Jepara regency either structurally or functionally and not yet reaching the plan period become indication of not yet effective mechanism of road maintenance. To create a reliable road maintenance performance in Jepara district needs analysis in identifying the factors that influence to get effective and efficient road maintenance management. The accuracy of performance targets with actual results achieved can not be properly guaranteed. Therefore, in planning road maintenance program, it is necessary to know the existence of dependency between various parameters such as allocation of maintenance fund, time of execution and resources needed.

Integrated control for all road maintenance construction processes especially with limited budget and resource allocation must be supported by coordination and organizing

efforts. Therefore, it is necessary to set a standard to achieve the objective of road maintenance, is to improve the condition both structurally and functionally. Therefore, an accurate analysis is needed to obtain the maintenance handling pattern of road segments in Jepara regency, by knowing the influence between the allocation of funds, human resources, equipment resources and material resources to provide appropriate criteria to the stakeholders in order to improve the performance road maintenance in Jepara district.

The maintenance of the pavement should be designed, managed, planned and then carried out in accordance with step by step. Planning and management is implemented by means of maintenance management procedures and systems. Road maintenance systems and procedures need to take into account the timing and improvement strategies and issues associated with the improvement program. It is recognized that to make consistent and continuous road improvements must be supported with accurate data for each road segment and accompanied by adequate allocation of funds. Although basically if it has been carried out regularly the annual required funds will be greatly reduced, as has been reviewed previously. Annual funds for maintenance programs are often based on annual trends and are based on previous years' experience. Road maintenance activities are classified against their frequency and effects on roads as shown in Figure 1.

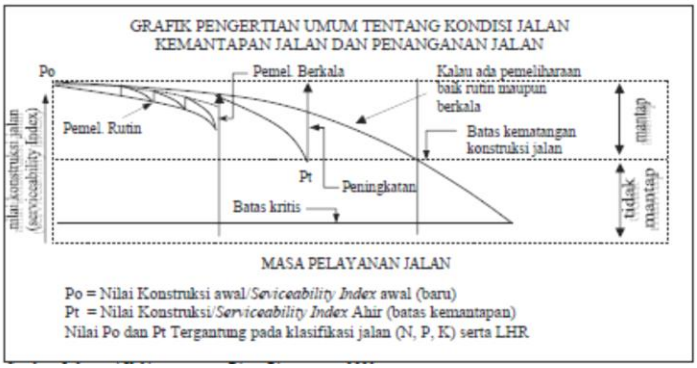

Figure 1. Graph of Public Understanding on Road Condition, Road Stability, and Road Handling
Source: Highway information,Highway Department (2003)

Field labor is one of the decisive factors in a successful construction project. if a work construction is not supported by good labor in terms of quality and productivity, it will not provide the desired project quality accomplishment. (Occupational Health and Safety).

Government Regulation No. 34 Year 2006 on Article 85 about Road explains that Budgeting in the context of the implementation of road management program is an activity of funds allocation which needed to realize the target of the program and local government has not been able to finance the construction of roads as all its responsibility, goverment can help based on the laws and regulations. (Sita and Mulyono, 2016).

Construction material is the most costly and time consuming component, therefore the selection of the right material is the most important element. The selection of suitable materials in time and cost as well as available manpower can improve the quality of the project while reducing construction costs (Permono and Mulyono, 2014).

The purpose of the use of heavy equipment in construction is to facilitate humans in doing their work, so that the expected results can be achieved more easily with a relatively shorter time. The use of ineffective construction equipment and the high price of equipment rent caused time overrun, which is the main cause of the high financial problems of the owner (Agsarini and Wiguna, 2015).

2. Method

This study is a case study, which is about the variables that affect the performance of road maintenance in Jepara regency. The case study is a study that aims to investigate in depth on a particular subject to give a complete representation of a particular subject (Indriantoro and Supomo, 2000).

The approach method used is descriptive method. Sigit (2001) defines descriptive research method as an activity that includes data collection in order to answer questions concerning the current state of the course of the subject of a research. This study is also a correlational study which conducted to determine the existence or relationship (relationship) variables affecting road damage with associated road damage.

2.1. Population and sample

The population target of this research is the employee of Public Works Department and Spatial Planning in Jepara Regency, contractor and consultant in Jepara district which is directly involved in road maintenance activities in 2016 - 2017. In order that sample size can be representative then calculated by using Slovin formula. So that the number of respondents who meet the criteria determined by researchers as follows: Government Agencies as many as 45 respondents, Service Providers as many as 23 respondents, Consultants as many as 22 respondents.

2.2. Instrument

The instrument which is used in this study can be seen in Table 1, where the independent variable X consists of 4 (four variables) i.e labor resources, allocation of funds, materials, and construction equipment. While the dependent variable Y is the performance of road maintenance.

Table. 1. Instrument

Variable	Kode	Indicators	References
Human Resources (X_1)	X_1.1	- Formal education of labor	Permono dan Mulyono, (2016)
	X_1.2	- Age of productive labor	
	X_1.3	- Experience of labor in handling maintenance	
	X_1.4	- Labor skills	
	X_1.5	- Placement of skilled labor	
	X_1.6	- Labor loyalty	
	X_1.7	- Quantity of labor	
	X_1.8	- Environmental conditions	
	X_1.9	- Coordination among labor	
	X_1.10	- K3 (Occupational Health and Safety)	
Budget Allocation (X_2)	X_2.1	- Funding system on a contract basis	Sita dan Mulyono (2016)
	X_2.2	- Term in payments to contractors	
	X_2.3	- Self-funded funding system	
	X_2.4	- Availability of funds and accuracy of payment	
	X_2.5	- Guarantee of implementation and maintenance	
	X_2.6	- Input in the form of contractor working capital, labor and material costs	
	X_2.7	- Output is revenue	
	X_2.8	- Return is margin or profit contractor and return on investment (ROI)	
Human Resources (X_3)	X_3.1	- Accuracy of material quality	Permono dan Mulyono (2016); Sita dan Mulyono,
	X_3.2	- Accuracy of material quantity	
	X_3.3	- On time delivery	
	X_3.4	- Availability of material resources	
	X_3.5	- Material price fluctuations	
	X_3.6	- Changes in material specifications	

Variable	Kode	Indicators	References
	X_3.7	- Condition Storage material	(2016)
	X_3.8	- Availability of substitution material	
Sumber daya peralatan (X_4)	X_4.1	- Proper Condition	Permono dan Mulyono (2016); Sita dan Mulyono, (2016)
	X_4.2	- Operator skills	
	X_4.3	- Ease of equipment mobilization	
	X_4.4	- Productivity of equipment	
	X_4.5	- Number of heavy equipment according to job specification	
	X_4.6	- Intensity of care	
	X_4.7	- Availability of spare parts of equipment	
	X_4.8	- Environmental conditions	
	X_4.9	- Machine capacity	
	X_4.10	- Compatibility of equipment with work field	
Road maintenance performance (Y)	Y_1	- Condition of surface cracking	Mulyono(2007)
	Y_2	- Conditions of deformation	
	Y_3	- Distortion conditions	
	Y_4	- Condition of surface roughness	

3. Results And Discussion

3.1. Determinacy Coefficient

The coefficient determination test of R^2 is used to find out how well the sample uses the data. R^2 measures the amount of reduction in the dependent variable obtained from the user of the independent variable. R^2 has a value between 0 and 1, with a high R^2 ranging from 0.7 to 1.

Table. 2. Table Determinacy Coefficient

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.813[a]	.661	.645	1.301	1.798

a. Predictors: (Constant), Construction equipment, Materials, Manpower resources, Allocation of funds

b. Dependent Variable: Road Maintenance Performance

Source: Primary data processed, 2017

R2 used is adjusted R square value which is R2 that has been adjusted. Adjusted R square is an indicator to determine the effect of adding time to an independent variable into the equation. The test results coefficient of determination can be seen in the appendix.

From the output it can be seen that the correlation value is 0.813 with the coefficient of determination 0.645 Thus 64.5% variation of change in road maintenance performance variables explained by the variables Construction equipment, Material, Labor resources, Allocation of funds to 35.5% influenced by other factors which we are not careful.

3.2. Multiple Linear Regression Analysis

Tabel. 3. Multiple Linear Regression Analysis

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-2.706	1.583		-1.710	.091
Labor Resources	.114	.052	.229	2.196	.031
Fund allocation	.287	.093	.369	3.085	.003
Material	.063	.029	.153	2.154	.034
Construction equipment	.095	.033	.238	2.923	.004

a. Dependent Variable: Road Maintenance Performance

Source: Primary data processed, 2017

Multiple linear regression analysis is done to find out how far independent variable has dependent variable influence. With these variables based on table 3., it can be written the equation of multiple linear regression is as follows:

$$Y = -2.706+0,114x_1+0,287x_2+0,063x_3+0,095x_4+e \quad (1)$$

The multiple linear regression equation can be explained as follows:

1. Constants of -2.706 can be interpreted if the resources of labor (X1) Allocation of funds (X2) Materials (X3) and Construction equipment (X4) and Dependent variable is Road Maintenance Performance (Y) value of -2.706.
2. The variable regression coefficient of labor resource (X1) is 0.114 means that any change of variable of labor resource (X1) for one unit will result in the change of Road Maintenance Performance of 0.114 units, assuming the other variable is fixed. The increase of one unit in the variable of labor resource (X1) will improve the Road Maintenance Performance of 0.114 units, otherwise the decrease of one unit in the variable of labor resource (X1) will decrease the Road Maintenance Performance by 0.114 units.
3. The coefficient regression of variable of fund allocation (X2) equal to 0,287 mean every change of variable of fund allocation (X2) equal to one unit hence will cause change of road maintenance performance equal to 0,287 unit, assuming other variable is fixed. The increase of one unit in the variable of Fund Allocation (X2) will increase the Road Maintenance Performance of 0.287 units, otherwise the decrease of one unit in the variable Allocation of funds (X2) will decrease the Road Maintenance Performance by 0.287 units.
4. Material Regression Coefficient of Material (X3) equal to 0.063 means that any change of Material (X3) variable for one unit will result in Road Maintenance Performance improvement of 0,063 units, assuming that other variable is fixed. The increase of one unit in Material variable (X3) will increase Maintenance Performance 0.063 units, otherwise one unit decrease in Material (X3) variable will decrease Maintenance of Road Performance by 0,063 units.
5. The variable regression coefficient of construction equipment (X4) of 0.095 means that any change of construction equipment variables (X4) of one unit will result in a change in road maintenance performance of 0.095 units, assuming that the other variable is fixed. An increase of one unit in the Construction equipment (X4) variable will improve Maintenance Performance 0.095 units, otherwise one unit

decrease in the Construction equipment (X4) variable will decrease the Maintenance Performance of the Road by 0.095 units.

6. Regression coefficient of variable of Material (X3) is 0.063 means that every change of material variable (X3) in one unit, the result of performance will change in Road Maintenance Performance of 0.063 units, assuming that the other variable is fixed. The increase of one unit on the variable of Material (X3) will increase Maintenance Performance 0.063 units, otherwise one unit decrease in Material (X3) variable will decrease Road Maintenance Performance by 0,063 units.
7. regression coefficient of construction equipment variable (X4) is 0,095 means that every change of construction equipment variable (X4) in one unit, it will cause the change of road maintenance performance by 0,095 unit, assuming that other variable is fixed. An increase of one unit in the Construction equipment variable (X4) will increase Maintenance Performance 0.095 units, otherwise one unit decrease in the Construction equipment variable (X4) will decrease the Maintenance Performance of the Road by 0.095 units.

3.3. Partial Hipothesys Test (t test)

Table. 4. Table of Test t Result

Coefficients[a]

Model	t	Sig.
(Constant)	-1.710	.091
Labor resources	2.196	.031
Funds allocation	3.085	.003
Material	2.154	.034
Construction equipment	2.923	.004

a. Dependent Variable: Road Maintenance Performance

Source: Primary data processed, 2017

A. Statistical Test of Labor Resources to Maintenance Performance

Labor resources influential positive and significant to the performance of road maintenance so that obtained the test results as follows: Table 4. above obtained t value arithmetic for Labor resources variable is 2.196 while the value of t table is 1.661 (df = 90-3-1 = 86) using a one-sided test. As for the significance value is 0.031. From the data can be interpreted that t arithmetic> t table and the results are positive (2.196> 1.661) and the significance value shows smaller than the significance level of 0.05 (0.031 <0.05)

B. Statistical Testing t Fund Allocation to Maintenance Performance

The allocation of funds has a positive and significant impact on Road Maintenance Performance so that obtained the following test results: Table 4. above obtained t value for allocation of fund variable is equal to 3,085 while t table value equal to 1,661 (df = 90-3-1 = 86) using one-sided test. As for the significance value is 0.003. From the data can be interpreted that t arithmetic> t table and the results are positive (3.085> 1.661) and the significance value shows smaller than the significance level of 0.05 (0.003 <0.05)

C. Material Statistics Test on Maintenance Performance

The material has a positive and significant impact on Road Maintenance Performance so that obtained the following test results: Table 4. above the obtained value t arithmetic for the Material variable is equal to 2.154 while the value of t table is equal to 1.661 (df = 90-3-1 = 86) using a one-sided test. As for the significance value is 0.034.

From the data can be interpreted that t arithmetic> t table and the results are positive (2.154> 1.661) and the significance value shows smaller than the significance level of 0.05 (0.034 <0.05).

D. Statistic t Test of Construction Equipment On Maintenance Performance

Construction equipment has a positive and significant impact on Road Maintenance Performance. As shown in the table 4. obtained the value of t arithmetic for the construction equipment variable is 2,923 while the value of t table is equal to 1.661 (df = 90-3-1 = 86) using a one-sided test. As for the significance value is 0.004. From the data can be interpreted that t arithmetic > t table and the results are positive (2923> 1.661) and the significance value shows less than the significance level of 0.05 (0.004 <0.05).

3.4. Simultaneous Test (F Test)

Table. 5. Table of Result of F Test

ANOVA[a]

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	280.543	4	70.136	41.412	.000[b]
Residual	143.957	85	1.694		
Total	424.500	89			

a. Dependent Variable: Maintenance Performance

b. Predictors: (Constant), Construction equipment, Materials, Human resources, Allocation of funds

Source: Primary data processed, 2017

Based on ANOVA test results or F test in Table 5. indicated that the value of F arithmetic is 41.412 while for the F table value is 2.47 (df 1 = 3 and df 2 = 90-3-1 = 86). Also obtained the significance value of 0.000 is smaller than the significance level of 0.05. Thus the value of F arithmetic > F table (41.412> 2.47) and its significance value is less than its significance level (0.000 <0.05) then the second hypothesis is accepted, it means that Labor or Human resource (X1), Fund allocation (X2), Material (X3), and Construction equipment (X4), and Dependent variable is Road Maintenance Performance (Y).

3.5. Discussion

A. Analysis of the Effect of Human Resources Variable on the Performance of Road Maintenance

Human resources factor effect on the performance of road maintenance shows that value of t arithmetic is 2,196 and value of t table is 1, 661 and p value is (Sig.) 0, 031. This means that t arithmetic is more than t table (2. 196 > 1, 661), then t arithmetic in the area rejected (Ho), it means that the nil hypothesis (Ho) rejected and alternative hypothesis (Ha) received. So that the first hypothesis Ha received, that there is a significant positive influence between the human resources factor and the performance of Road Maintenance.

This is in accordance with the research conducted by Megaria Elisabeth P., (2015) about the performance of Public Works Department in the road maintenance and bridge in Toba Samosir Regency, explained that there are two indicators that are less both in terms of road maintenance and bridges, are the indicator of responsiveness and indicator of accountability because the lack of facilities and infrastructure in terms of monitoring.

In the accountability, not been carried out routine maintenance due to lack of facilities for routine inspection.

B. Analysis of the Effect of Fund Allocation Variable on the Performance of Road Maintenance

Fund allocation factor effect on the performance of road maintenance shows that value of t arithmetic is 3.085 and value of t table is 1, 661 and p value is (Sig.) 0,003. This means that t arithmetic is more than t table (3.085 > 1,661), then t arithmetic in the area rejected (Ho), it means that the nil hypothesis (Ho) rejected and alternative hypothesis (Ha) received. So that the first hypothesis Ha received, that there is a significant positive influence between fund allocation factor and the performance of Road Maintenance.

It is in accordance with Government Regulation No. 34, year 2006 in Article 85 about the way, explained that budgeting in order to the implementation of the handling program of the road network is the activity of fund allocation to realize the program target. If the Government has been unable to finance the road construction which became its responsibilities, the Government can help in accordance with the regulation.

C. Analysis of the Effect of Material Variable on the Performance of Road Maintenance

Material factor effect on the performance of road maintenance shows that value of t arithmetic is 2.154 and value of t table is 1, 661 and p value is (Sig.) 0,034. This means that t arithmetic is more than t table (2.154 > 1,661), then t arithmetic in the area rejected (Ho), it means that the nil hypothesis (Ho) rejected and alternative hypothesis (Ha) received. So that the first hypothesis Ha received, that there is a significant positive influence between material factor and the performance of Road Maintenance.

It is in accordance with the research conducted by Permono and Mulyono, (2014) about analysis of the influence of employment and material availability and construction equipment to the achievement of the quality of the road (case studies: Yogyakarta National Road).

D. Analysis of the Effect of Construction Equipment Variable on the Performance of Road Maintenance

Construction equipment factor effect on the performance of road maintenance shows that value of t arithmetic is 2.923 and value of t table is 1, 661 and p value is (Sig.) 0, 004. This means that t arithmetic is more than t table (2.923 > 1, 661), then t arithmetic in the area rejected (Ho), it means that the nil hypothesis (Ho) rejected and alternative hypothesis (Ha) received. So that, the first hypothesis Ha received, that there is a significant positive influence between construction equipment factor and the performance of Road Maintenance.

It is in accordance with the research conducted by Permono and Mulyono (2014), describes about the analysis of the influence of employment and material availability and construction equipment to the achievement of the quality of the road (case studies: Yogyakarta National Road) that in the construction equipment, there are influential factors are: (1) conditions of fitness; (2) skills of operator; (3) productivity of equipment; (4) the amount of heavy equipment; (5) conformity with the field conditions.

4. Conclusion and Suggestions

4.1. Conclusion

After the researchers conducted analysis in the previous chapters, the researchers can provide some conclusions as follows:

1) There are the influence factors; human resource, the allocation of funds, material, construction equipment on the performance of road maintenance. This can be seen from the ANOVA test or F test that shows value of F arithmetic is 41.412 while for the value F table is 2.47. In addition, the value of significance is 0, 000 which is less than significance standard is 0, 05. Partially, Resource of Employment factors has a positive effect with p value (Sig.) 0, 031. Found allocation has a positive effect with p value (Sig.) 0, 003. Material factor has a positive effect with p value (Sig.) 0, 034 while the construction equipment factor has a positive effect with p value (Sig.) 0, 004, which is less than 0,05.
2) The most significant variable on the performance of road maintenance in Jepara is the allocation of funds factor and construction equipment factor. It is appropriate with circumstances in the field that the use of funds to be one priority to the road maintenance. Besides that, construction equipment has a big impact to effective and efficiency of road maintenance.

4.2. Suggestions

Based on conclusion, it can be taken some suggestions that is expected to be beneficial to the parties concerned. The suggestions are:

1) In implementing tasks and programs of road maintenance, members of Public Works Department Jepara must be able to apply the system of appropriate working, in order to each program can be completed in accordance with the planning.
2) In accordance with the analysis of existing research, then it expected that Public Works Department in Jepara can provide the allocation of funds or budget for road maintenance and can provide tool facilities as needed in the field.
3) Increasing in supervision of program of road maintenance in Jepara Regency. Participation of member of Public Works Department in Jepara is considered can be important role in the success of a program.

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