

Analysis of Factors Affecting Low Quality Performance of Regency Road Construction in Tanah Laut Regency

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ABSTRACT: Road construction will not be efficient and will result in waste due to the low quality performance of road construction. This research aims to study the factors that affect the low quality performance of regency road in Tanah Laut Regency. This research uses descriptive analysis method. Data was collected by distributing questionnaires and interviews to the owners, consultants, and contractors. The data analysis used in this research is multiple linear regression.

The results of this research are 1) The factors that affect the low quality performance of regency road construction in Tanah Laut Regency include human resources, material, equipment, work control and evaluation, managerial and implementation, finance, design, and environment; 2) The most dominant factor affecting the low quality performance of road construction is the design factor; 3) The strategies required to improve the quality performance of regency road construction in Tanah Laut Regency include: the owner should pay special attention to the planning process, starting from the procurement selection process, work process, and planning products by evaluating each process of work planning before handing over the planning products, the physical implementation process should optimize control by strengthening supervision and implementation of quality control.

KEYWORDS: control, design, quality performance, road construction.

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I. INTRODUCTION

Proper road conditions will facilitate mobility amongst the community in conducting economic activities and other social activities. However, if there is road damage, it will not only interfere with economic and social activities, but will also cause accidents. Indicators of road damage can be seen from the road surface conditions, both structurally and functionally.

As a form of improving the quality of community services in Tanah Laut Regency, it is necessary to equally distribute development in all fields, making the availability of adequate road infrastructure one of the determining factors. This requires special attention, mainly in terms of road provision, given that the steady road condition in Tanah Laut Regency is still poor. Every year the Tanah Laut Regency Government through the Public Works Office conducts road improvements using a large budget, both from the APBD and funds from the center in the form of Special Allocation Funds (DAK). The roads that have been improved are often found damaged either in the form of cracks or collapse of the pavement.

Almost every year, in Tanah Laut Regency, a large number of road improvements and construction projects on regency roads are of concern to various groups in community due to the quality of road construction not fulfilling their expectations. Often road damages occur within the design life in which they should not otherwise have yet occurred.

In the implementation of the regency road project in Tanah Laut, there are several factors that are considered as causes for not achieving the design life, including changes in design, changes in activity location, equipment, human resources, work implementation, soil condition, material, finance, and the environment. In general, the physical road will experience a progressive process of deterioration since the road is first opened to traffic. However, at least the existing road conditions can be maintained to remain relatively adequate during the

design life. To overcome this, a method is required to make road conditions adequate in quality and comfortable to use through the preparation of a road maintenance program, both routine maintenance and periodic maintenance (Ditjen Bina Marga, Ministry of Public Works, 1983).

II. LITERATURE REVIEW

2.1 Quality Performance

Quality is defined as a comprehensive description and characteristic of goods or services that exhibit an ability to meet specified or implied requirements (Minister of Public Works Regulation No. 04/PRT/M/2009 concerning Quality Management Systems/QMS). Quality is the level that a product has in order to meet the requirements, needs, and expectations of customers (Haryono, 2005). According to Abubshait and Al Atiq (1999), quality must have the following characteristics:

1. Fulfilling the prescribed specifications, norms, standards, guidelines, and manuals;
2. Effective and efficient;
3. Beneficial in a strong, safe, and comfortable way;
4. Constantly available when needed.

According to Ferdian (2018), indicators of quality performance in a road construction are as follows:

1. Provision of the utmost service according to the function and design life;
2. Availability of quality road construction materials;
3. Ability and availability of equipments during construction activities;
4. A good workforce in terms of quality and productivity.

2.2 Factors Affecting the Quality Performance of Road Construction

The factors that affect the quality performance of road construction are as follows:

1. **Human Resources**
Poor human resource management will negatively affect project quality performance. Human resources in a project need to be categorized (Husen, 2010) in order for the management to be efficient.
2. **Material**
According to Husen (2010), material management requires the availability of information regarding the specifications, price, and quality concerned.
3. **Equipment**
The equipment used in a project must be in accordance with the conditions of work which are determined by the situation at the site, the construction materials used, and other requirements.
4. **Finance**
Adequate financial management of the project will help ensure that the projected benefits are achieved. This requires managing cash flow and reporting it periodically and attentively. Consequently, this also facilitates the audit process if needed. Finally, the information provided from financial management is thus reliable for decision making purposes.
5. **Site Management**
Site management is conducted by monitoring and controlling various operational aspects of the project. This allows treatments of any irregularities that may arise in the site.
6. **Planning**
The design results must be restated in the form of shop drawings to later become a guide for facilitators in the field. These documents also require monitoring, controlling, and updating.
7. **Natural/Environmental Conditions**
Environmental conditions have an immense effect on road infrastructure works. Geological, topographical, hydrological, and climatological factors determine not only the necessary design but also how the design should be implemented.

2.3 Measurement of Factors Affecting the Quality Performance of Road Construction

The measurement of factors affecting the low quality performance of road construction is conducted using multiple linear regression. In this stage, tests are conducted to check whether certain factors have a significant effect on road construction variables both simultaneously and partially. The simultaneous effect indicates the effect of the research factors as a whole, while the partial effect indicates the effect of each factor on the low quality performance of road construction.

Multiple linear regression analysis is used to explain the relationship of the effect of two or more independent variables on one dependent variable. The equation is as follows:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + \dots + b_nX_n$$

where Y is the quality of road construction, X_n is the independent variable/predictor, n is the number of subsequent research factor orders, a is the constant/intercept value, and b is the predictor coefficient/regression coefficient.

III. RESEARCH METHOD

3.1 Research Location and Objects

This research was conducted on the regency road construction project in Tanah Laut Regency. The objects studied are the factors that affect the low quality performance of regency road construction in Tanah Laut Regency.

3.2 Data Collection Technique

Data collection that was conducted are as follows:

1. Primary Data Collection

Primary data is collected directly by distributing questionnaires accompanied by interviews with two-way information (information about the explanation/filling of the questionnaire). In this case, respondents were asked to fill out a questionnaire based on their experience in controlling the implementation of road construction projects. The questionnaire proposed is a questionnaire regarding the weighting of factors and variables from respondents who are directly involved in the field.

2. Secondary Data Collection

Secondary data is obtained from data and information in literatures, such as books, journals, papers, previous research results, and can also be described as processed data. Secondary data collection in this study are as follows:

- a. The data used for the theoretical basis of research, obtained from literature, journals, papers, and others.
- b. Data for research variables, taken from books, journal papers, and previous research results.

3.3 Data Processing Technique

Data is processed based on a questionnaire filled out by respondents in the following way:

1. The research variable scoring is conducted by distributing questionnaires to respondents;
2. Before processing the data, the research validation test is first conducted;
3. The results of data processing are then analyzed using analysis tools to obtain the results of the analysis.

3.4 Data Analysis Technique

The results of data processing will then be analyzed using the multiple linear regression method as previously stated. The validity test is used to detect invalid questions in the research questionnaire which should then be discarded or replaced with new ones.

1. Validity Test

The validity test was conducted using the corrected item-total correlation, namely by correlating the score of each item with the total score. The statistical technique used to find the correlation coefficient is Pearson's product moment technique. The questionnaire is considered valid if the value of $r > r_{critical}$, however it is considered invalid if the value of $r < r_{critical}$.

2. Reliability Test

The reliability of a questionnaire needs to be ensured to provide consistent measurement results. In this research, the reliability test was conducted using Cronbach's alpha. The questionnaire is considered to be reliable if the Cronbach's alpha value is > 0.60 , however the questionnaire is considered unreliable if the Cronbach's alpha value is < 0.60 .

Tests carried out in the regression analysis include:

1. Simultaneous Effect Test (F Test)

The simultaneous effect test is also called the F test, where the function is to determine the effect of all independent variables as a whole on the dependent variable. If the value of $F > F_{critical}$, then all the independent variables in this research are considered to have a significant effect on the dependent variable.

2. Partial Effect Test (t Test)

Partial effect test or t test, is conducted to test the significant effect of each independent variable on the dependent variable. If the value of $t > t_{critical}$, then the independent variable has a significant effect on the dependent variable.

IV. RESULT AND DISCUSSION

4.1 Multiple Linear Regression Test

The multiple linear regression model as in equation (1) is solved using SPSS assistance for $n = 8$, where X_1 is the human resource factor, X_2 is the material factor, X_3 is the equipment factor, X_4 is the work control and evaluation factor, X_5 is the managerial factor and implementation, X_6 is the financial factor, X_7 is the design factor, and X_8 is the environmental factor. The regression model obtained is as follows:

$$Y = 0,277 + 0,047 X_1 - 0,023 X_2 + 0,001 X_3 + 0,032 X_4 + 0,012 X_5 + 0,016 X_6 + 0,063 X_7 + 0,012 X_8$$

The interpretation is given as follows:

1. $\beta_1 = 0,047$
This regression coefficient indicates that if there is a unit increase in X_1 and other variables are considered constant or equal to 0, there will be an increase in Y of 0.047. In addition, there is a positive effect of X_1 on Y , meaning that the human resource factor affects the low quality performance of regency roads in Tanah Laut Regency.
2. $\beta_2 = - 0,023$
This regression coefficient indicates that if there is a unit increase in X_2 and other variables are considered constant or equal to 0, then there will be a decrease in Y of 0.023. In addition, there is a negative effect of X_2 on Y , meaning that material changes affects the low quality performance of regency roads in Tanah Laut Regency.
3. $\beta_3 = 0,001$
This regression coefficient indicates that if there is a unit increase in X_3 and other variables are considered constant or equal to 0, then there will be an increase in Y of 0.001. In addition, there is a positive effect of X_3 on Y , meaning that the equipment factor affects the low quality performance of regency roads in Tanah Laut Regency.
4. $\beta_4 = 0,032$
This regression coefficient indicates that if there is a unit increase in X_4 and other variables are considered constant or equal to 0, then there will be an increase in Y of 0.032. In addition, there is a positive effect of X_4 on Y , meaning that the work control and evaluation factor affects the low quality performance of regency roads in Tanah Laut Regency.
5. $\beta_5 = 0,012$
This regression coefficient indicates that if there is a unit increase of X_5 and other variables are considered constant or equal to 0, then there will be an increase in Y of 0.012. In addition, there is a positive effect of X_5 on Y , meaning that the managerial and implementation factor affects the low quality performance of regency roads in Tanah Laut Regency.
6. $\beta_6 = 0,016$
This regression coefficient indicates that if there is a unit increase in X_6 and other variables are considered constant or equal to 0, then there will be an increase in Y of 0.016. In addition, there is a positive of X_6 on Y , meaning that the financial factor affects the low quality performance of regency roads in Tanah Laut Regency.
7. $\beta_7 = 0,063$
This regression coefficient indicates that if there is a unit increase of X_7 and other variables are considered constant or equal to 0, then there will be an increase in Y of 0.063. In addition, there is a positive of X_7 on Y , meaning that the design factor affects the low quality performance of regency roads in Tanah Laut Regency.
8. $\beta_8 = 0,012$
This regression coefficient indicates that if there is a unit increase of X_8 and other variables are considered constant or equal to 0, then there will be an increase in Y of 0.012. In addition, there is a positive of X_8 on Y , meaning that the environmental factor affects the low quality performance of regency roads in Tanah Laut Regency.

Furthermore, the results of the partial effect test are as follows:

1. Human Resource Factor (X_1) Effect
The t value of the human resource factor (X_1) is 2.629, while the $t_{critical}$ value is 1.679. Comparison of the t value with the $t_{critical}$ value, and from the significant value, it can be implied

that the human resource factor (X1) has a significant effect on the quality performance of road construction (Y). This is due to the t value being greater than the t critical value ($2.629 > 1.679$), and the significant value is $0.013 < 0.05$.

2. Material Factor (X2) Effect

The t value of the material factor (X2) is -1.418, while the t critical value is 1.679. Comparison of the t value with the t critical value, and from the significant value, it can be implied that the material factor (X2) does not have a significant effect on the quality performance of road construction (Y). This is due to the t value being smaller than the t critical value ($-1.149 < 1.679$), and the significant value is $0.165 > 0.05$.

3. Equipment Factor (X3) Effect

The t value of the equipment factor (X3) is 0.039, while the t critical value is 1.679. Comparison of the t value with the t critical value, and from the significant value, it can be implied that the equipment factor (X3) does not have a significant effect on the quality performance of road construction (Y). This is due to the t value being smaller than the t critical value ($0.039 < 1.679$), and the significant value is $0.969 > 0.05$.

4. Work Control and Evaluation Factor (X4) Effect

The t value of the work control and evaluation factor (X4) is 2.162, while the t critical value is 1.679. Comparison of the t value with the t critical value, and from the significant value, it can be implied that the work control and evaluation factor (X4) has a significant effect on the quality performance of road construction (Y). This is due to the t value being greater than the t critical value ($2.162 > 1.679$), and the significant value is $0.037 < 0.05$.

5. Managerial and Implementation Factor (X5) Effect

The t value of the managerial and implementation factor (X5) is 0.742, while the t critical value is 1.679. Comparison of the t value with the t critical value, and from the significant value, it can be implied that the managerial and implementation factor (X5) does not have a significant effect on the quality performance of road construction (Y). This is due to the t value being smaller than the t critical value ($0.742 < 1.679$), and the significant value is $0.463 > 0.05$.

6. Financial Factor (X6) Effect

The t value of the financial factor (X6) is 1.190, while the t critical value is 1.679. Comparison of the t value with the t critical value, and from the significant value, it can be implied that the financial factor (X6) does not have a significant effect on the quality performance of road construction (Y). This is due to the t value being smaller than the t critical value ($1.190 < 1.679$), and the significant value is $0.274 > 0.05$.

7. Design Factor (X7) Effect

The t value of the design factor (X7) is 4.465, while the t critical value is 1.679. Comparison of the t value with the t critical value, and from the significant value, it can be implied that the design factor (X7) has a significant effect on the quality performance of road construction (Y). This is due to the t value being greater than the t critical value ($4.465 > 1.679$), and the significant value is $0.000 < 0.05$.

8. Environmental Factor (X8) Effect

The t value of the environmental factor (X8) is 1.077, while the t critical value is 1.679. Comparison of the t value with the t critical value, and from the significant value, it can be implied that the environmental factor (X8) does not have a significant effect on the quality performance of road construction (Y). This is due to the t value being smaller than the t critical value ($1.077 < 1.679$), and the significant value is $0.289 > 0.05$.

4.2 Dominant Factor and Questionnaire Observation Results

The design factor (X7) is the factor with the largest beta coefficient, which is 0.063 or 6.3%, meaning that the low quality performance of regency road construction in Tanah Laut Regency (Y) is mostly affected by the design factor (X7) than other factors (X1, X2, X3, X4, X5, X6, and X8).

The design management on a project has a big impact on the success and failure of the project itself. Based on the results of observations and interviews, the planning process for regency road construction in Tanah Laut Regency conducted by the planning consultant was not as expected. Often in making road construction designs, planning consultants only look at the previous design, while the previous design is not necessarily suitable for use on the planned road. Planning consultants did not conduct in-depth surveys, hence designs often cannot be implemented due to construction inaccuracy. This occurs due to the lack of control over the work planning by the owner. There is no control over the progress of work planning,

starting from surveys, determining the type of construction, and presenting the results of the consultant's work planning.

4.3 Strategy Formulation

In the formulation of strategies to improve the quality performance of regency road construction in Tanah Laut Regency, there are three factors that have a significant effect with the biggest regression coefficient from the analysis. The factors that have the biggest regression coefficient value are the design factor (X_7), the work control and evaluation factor (X_4), and the human resource factor (X_1). This strategy is composed based on literature studies and discussion results with experts described as follows:

1. Design
 - a. The owner or the PPK (Commitment-Making Officer) should form a technical team that accompanies KDP to control the progress of work planning and present the planning results until they hand over the work planning.
 - b. In making the RAB (Cost Budget Plan), the planning consultant should input the work item for the manual making of road operation and maintenance procedures. This manual is prepared by the contractor as a guideline for road operation and maintenance provided to the PPK.
 - c. The owner (Tanah Laut Regency Public Works Office) should pay special attention to the planning process, starting from the procurement selection process, work process, and planning products by evaluating each work planning process before submitting the planning product.
 - d. Planning consultants should conduct in-depth planning and pay attention to road construction planning standards and create design drawings and technical specifications in order to facilitate construction.
2. Work Control and Evaluation
 - a. Make effective use of the field supervisory role and project control procedures in the physical implementation process, by strengthening supervision and implementing quality control.
 - b. Conduct daily evaluations and submit work progress reports regularly.
3. Human Resources
 - a. The owner, contractor, planning consultant, and supervisory consultant should prepare sufficient and necessary human resources in accordance with project conditions.
 - b. Project managers and construction workers should be competent and master the field of work being handled.

V. CONCLUSION

The factors that affect the quality performance of road construction based on the results of the literature study concluded in this research are human resources, material, equipment, work control and evaluation, managerial and implementation, finance, design, and environmental factors.

Based on the analysis results of the effect using multiple linear regression, there are three factors that have a significant effect on the low quality performance of road construction, namely human resource, work control and evaluation, and design factor. The most dominant factor affecting the quality performance of regency road construction in Tanah Laut Regency is the design factor.

Strategies to improve the quality performance of regency road construction in Tanah Laut Regency include: owners should pay special attention to the planning process, starting from the procurement selection process, work process, and planning products by evaluating each process of work planning before handing over the planning product, in the physical process implementation it should be controlled optimally by strengthening supervision and implementing quality control.

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