

Study of the Quality of Road Construction Work Affected by Refocusing Policies during the COVID-19

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Abstract - In 2020 Indonesia began to recover from the covid-19 pandemic. The refocusing policy carried out by the government of the Republic of Indonesia for handling COVID-19, where most of the focus is on spending on health equipment and materials. As a result, many construction works were canceled or budget reductions occurred. Increased competition among providers for jobs has resulted in providers submitting bids of less than 80% of the estimated own price (HPS) when participating in tenders. The research was conducted on concrete road improvement activities in Grobogan Regency during the Covid-19 period, namely in 2020 and 2021. The data used for the analysis is secondary data consisting of the name of the work package, the HPS value, the number of bidders, and the results of the compressive strength test of concrete. The thickness of the laid concrete. From this study, the number of bidders is the factor that most influences the bid proportion. Jobs with an offer of <80% HPS value have more samples that do not match the plan's quality than jobs with an offer of >80% HPS value. At an offer <80%, the HPS value has some samples that are less than the planned volume, which is more when compared to work with an offer > 80% HPS value.

Keywords: Concrete Road, Covid-19, Supply, Quality, Quantity.

I. INTRODUCTION

Seen from the Map of Central Java Province, Grobogan Regency is located between two Kendeng Mountains, which stretch from west to east and are in east. The Grobogan area is bordered to the west by Semarang and Demak, to the north by Kudus, Pati, and Blora, to the east by Blora, and south by Ngawi (East Java), Sragen, Boyolali, and Semarang [1]. Grobogan Regency has an unstable subgrade condition of clay [2]. Hazardous subgrade condition has caused the construction plan of the road built in Grobogan Regency not to be reached. The road construction usually used in the Grobogan district is concrete because it is more durable than flexible reinforcement.

In 2020 Indonesia began to be affected by the co-19 pandemic [3]. The impacts arising from the Covid-19

Pandemic are starting to emerge, such as socio-economic impacts Refocusing activities carried out by the government have set state budget allocations for handling COVID-19 [4] where most are focused on spending on health equipment and materials [5], causing many government procurement activities to be canceled or their ceiling values cut [6]. One type of government procurement of goods and services affected by this policy is construction work [7]. Construction work is the whole or part of an activity that includes construction, operation, maintenance, demolition, and rebuilding of a building. Refocusing activities occur not only in the central government but also in regional governments. During the pandemic, many construction companies experienced growth in a negative direction[8]. In facing an economic downturn during a crisis, such as during a pandemic, a survival strategy is vital for companies [9]. As a result, there is tighter competition among construction service providers in winning tenders for existing construction procurement activities [10]. As a result of competition between providers, several service providers submit offers of less than 80% of the value of their Self-Estimated Price when participating in tenders. Special attention is needed to service providers offering less than 80% of the owner's estimated value [11]. With this provision, it is indirectly stated that with a cost below 80%, the owner estimate will face a greater risk, namely related to the risk of reduced quality of work due to bidding of less than 80% of the value of the owner's estimate[12]. On the other hand, the bid price is undoubtedly influenced by the value of the project, the level of competition [13], the location of the work [14], and the weight of the main work [15]. The problems above can be formulated as follows: (1) is there a relationship between the bid price and the owner's estimated value, the number of bidders, the location of the work, and the weight of the main work, (2) the effect of the bid price on the quality of the work, and (3) the effect of the bid price to the quantity of work.

II. MATERIALS AND METHODS

This research problem-solving approach is based on literature review and field surveys. The field survey was directed to obtain the necessary data: the variables influencing the bidding price, the quality of work, and the quantity of

work. The initial step is to look for the influence of variables that might affect the percentage of offers submitted by service providers. These variables include the HPS value, the number of tender participants, the distance of the work location to the city center, and the percentage of concrete work. Next, an analysis of the effect of the supply percentage on the quantity of concrete was carried out from the results of the Core drill test. The quantity of work can be seen from the pavement thickness taken during the core drill [16]. The core drill results of the specimens collected were subjected to a concrete compression test to determine the quality of the spread concrete [17].

Research that aims to determine the relationship between the bid price and the HPS value, the number of bidders, the location of work, and the weight of the main work is carried out using the SPSS 27 application [18]. The analytical technique used is multiple linear analysis techniques [19]. Multiple linear regressions is used when there are two or more independent variables (X) to the dependent variable (Y). The form of the multiple linear regression equation is as follows:

$$Y = a + b_1 X_1 + b_2 X_2 + \dots + b_n X_n \quad (1)$$

Where a is a constant value that shows the value of Y if X is zero, b1 is the regression coefficient which shows the magnitude of the change in the value of Y if there is a change of one unit from X1, where n is the number of independent variables.

Conclusions are made with the Coefficient of determination (R²), F test, and t-test. The Coefficient of determination test calculates how far the model's ability to describe the variation of the independent variables is. The value of the Coefficient of determination is between zero (0) and one (1).

There are categories for the R2 value: strong, moderate, and weak. The value of R2 is said to be strong if it is more than 0.75. The R2 value is in the moderate category if it is between 0.75 to 0.50, and the R2 value below 0.50 is included in the weak category. [20] A small R2 value means the dependent variables do not describe the independent variables. A value close to one (1) means that the dependent variables can be used to predict variations in the independent variables. The F test determines whether the independent variables significantly affect the dependent variable simultaneously, using a significant degree of $\alpha = 0.05$. If the result ($\text{sig. F} \leq \alpha$ (0.05)), then the hypothesis is accepted, meaning that the independent variable has a significant effect on the dependent variable. If the result ($\text{sig. F} > \alpha$ (0.05)), then the hypothesis is rejected, which means the independent variable does not. If the result ($\text{sig. F} > \alpha$ (0.05)) means that the independent variable has no effect simultaneously on the dependent

variable. The t-test aims to show the effect of one dependent variable individually in explaining the variation of the independent variables. The test was carried out with a significance level of $\alpha = 0.05$ (5%). Rejection or acceptance of the hypothesis is carried out with the criterion that if the significance is > 0.05 , the hypothesis is rejected, which means that the independent variables have no significant effect. The significance is > 0.05 can be interpreted as the independent variables do not significantly influence the dependent variable. The hypothesis is accepted if the significance is < 0.05 (significant regression coefficient), which means that the independent variable partially influences the dependent variable [21].



Figure 1: Location of study area

III. RESULT

During the Covid-19 pandemic, the effects were felt in the range of 2020 and 2021 in Indonesia. Service providers considered many factors in making offers for road work packages in Grobogan Regency. Several factors include the influence of the HPS value on the work package, the influence of the number of bidders, the influence of the percentage of concrete work items in the work package, and another factor that can influence the distance of the work location to the district city center.

3.1 Factors that affect the bid price

Tests using the SPSS statistical application aim to see the effect of the percentage of concrete work, the number of tender participants, the distance of the work location from the city center, and the amount of the HPS value on offers from service providers on concrete road construction work packages. The following results are obtained from the tests carried out with the SPSS application with multiple linear regression models.

Table 1: Calculation results of the coefficient of determination

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.900 ^a	.810	.684	.04113

a. Predictors: (Constant), Jumlah Peserta, Jarak Dari Kota (Km), Persentase Beton (%), HPS (M)

The coefficient of determination is obtained by a value of 0.81, which means that the percentage of bidding value on the owner estimate (Y) can explain the owner estimate value (X1), the number of bidders (X2), the distance of the work location from the city center (X3) and the percentage of concrete work items (X4)). The coefficient of determination of the owner estimate (Y) is 81%. The remaining 19% is influenced by other variables outside the model, or the regression equation is inaccurate enough to describe the correlation between the dependent and independent variables.

Table 2: Calculation results of the effect of independent variables on the dependent variable together

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.043	4	.011	6.414	.023 ^b
	Residual	.010	6	.002		
	Total	.054	10			

a. Dependent Variable: Presentase Penawaran (%)

b. Predictors: (Constant), Jumlah Peserta, Jarak Dari Kota (Km), Persentase Beton (%), HPS (M)

It obtained a significance of 0.000023. The degree of significance used is $\alpha = 0.05$, the result (sig. F) $\leq \alpha$ (0.05), the hypothesis is accepted, meaning that there is an influence on the size of the HPS value (X1), the number of bidders (X2), the distance between the work location and the city center (X3) and the percentage of concrete work items (X4) simultaneously affect the percentage of bidding value that has HPS (Y) simultaneously.

Table 3: The results of calculating the effect of independent variables on the dependent variable separately

Model		Unstandardized Coefficients	Standardized Coefficients	t	Sig.
1	(Constant)	.953	.177	5.381	.002
	Persentase Beton (%)	.193	.272	.132	.708
	Jarak Dari Kota (Km)	.001	.002	.159	.817
	HPS (M)	-.001	.004	-.074	.828
	Jumlah Peserta	-.006	.002	-.795	.449

a. Dependent Variable: Presentase Penawaran (%)

From the table value of the percentage of the t distribution, the result value of the degree of significance is $\alpha = 0.828$. The degree of significance used is $\alpha = 0.05$ for the significant independent variable. The owner estimate value is $0.828 < \alpha = 0.05$, so the hypothesis is not accepted. It means there is no significant influence on the value of the owner's estimate (X1) on the bid percentage (Y) in partial terms. In calculating the t value, it is negative (-), meaning that the

relationship between the owner estimates the value and the bidding percentage is negative; namely, the higher the owner estimated value, the lower the bidding percentage [22]. It can result in projects with a small owner estimate value; prospective service providers may expect higher profit margins than projects with a more significant owner estimate value [23]; for example, prospective service providers will prefer to get 5 % of the value of 20 billion rather than 10% of the value of 2 billion.

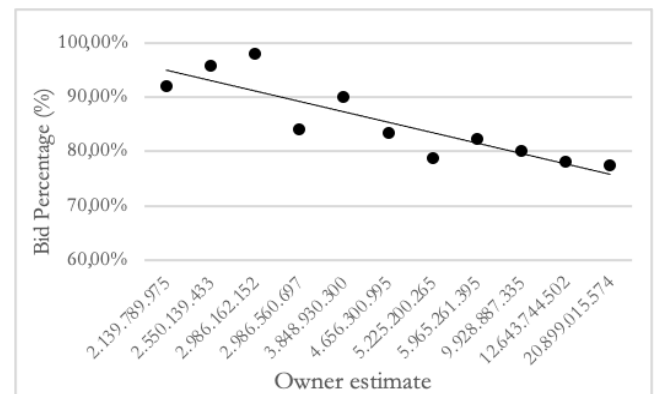


Figure 2: Graph of the relationship between the bid percentage and the owner's estimated value

The degree of significance of the calculation results is $\alpha = 0.049$ for the independent variable, the number of tender participants, and the degree of significance $\alpha = 0.049 < \alpha = 0.05$, then the hypothesis is accepted. It means there is a significant independent effect of the number of bidders (X2) on the percentage of bids (Y) on a partial basis. The calculation of the t-count value is negative (-), meaning that the relationship between the number of bidders and the percentage of bids has a negative relationship—namely, the higher the number of bidders, the lower the percentage of the bidding value. When competitors increase, tender participants become more aggressive by reducing bids to a specific limit [24].

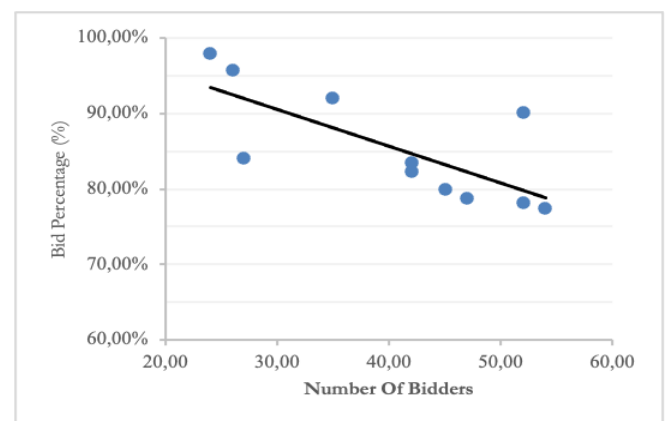


Figure 3: Graph of the relationship between the number of bidders and the percentage of bids

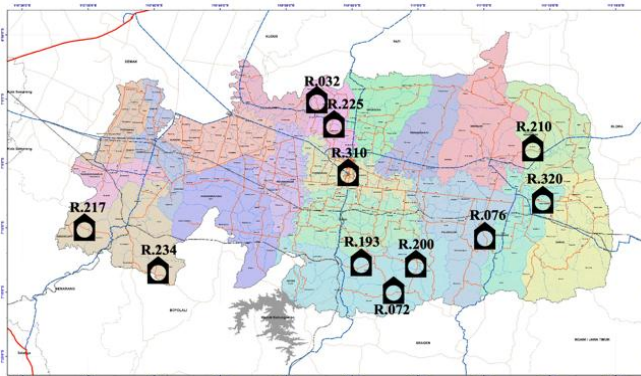


Figure 4: Distribution of Job Locations

The degree of significance of the calculation results is $\alpha = 0.445$ for the independent variable, the number of bidders, the degree of significance $\alpha = 0.445 > \alpha = 0.05$ for the distance variable from the city center table; the hypothesis is not accepted, and it can be interpreted that there is no significant independent effect of distance from the city centre (X3) to the percentage of supply (Y) in partial terms. The calculation of the t-count value is positive (+), meaning that the relationship between the distance from the location to the city center and the percentage of bids has a positive relationship, namely, the farther the distance from the work location to the city centre causes a higher percentage of the bidding value.

The relationship between the distance of the work location to the city center with a positive percentage of the bid price can be caused by the unavailability of warehouses owned by service providers at locations far from the city centre because this causes the need for costs to mobilize materials and tools used in carrying out work [25]. The high cost of work in areas far from the city center is also due to the topographical conditions of the Grobogan Regency, surrounded by limestone hills, which is a particular challenge in constructing concrete road works in the Grobogan Regency. The difficulty level of the terrain also results in increased costs that must be incurred by service providers when carrying out work in areas far from the city centre [26].

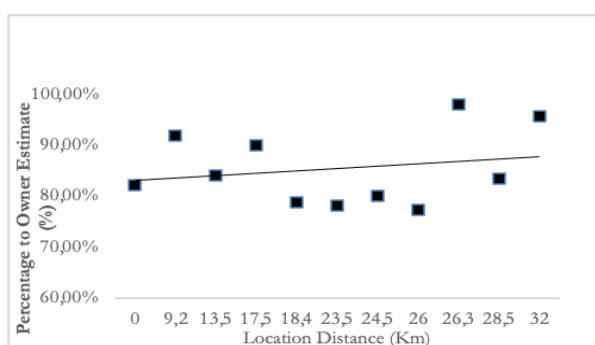


Figure 5: Graph of the relationship between the percentage of supply and the distance from the job location to the city center

The significance value for the independent variable percentage of concrete work is $0.505 > \alpha = 0.05$, so the hypothesis is not accepted, so it can be interpreted that there is no significant independent effect of the distance of the work location to the city center (X4) on the percentage of offers (Y) in partial terms. In the calculation of the T-count value is negative (-), meaning that the relationship between the percentage of concrete work and the percentage of bidding has a negative relationship, namely, the higher the percentage of concrete work, the lower the percentage of the bidding value. It is because providers tend to be more careful with concrete work items. In Grobogan Regency, the testing method used as the basis for paying for work is testing the quality and quantity of concrete work. When the concrete has been spread, a core drill will be held to determine the thickness of the spread concrete and as a method for taking concrete compressive strength specimens. Payment will be cut for concrete work with compressive strength results that are not as planned, provided that for every 1% decrease in concrete quality, a 1.5% reduction in the concrete unit price will be reduced by 15%. If the stretched concrete has a quality of less than eighty-five percent (<85%) of the design compressive strength, then all items in that segment are not paid for by the work items below them.

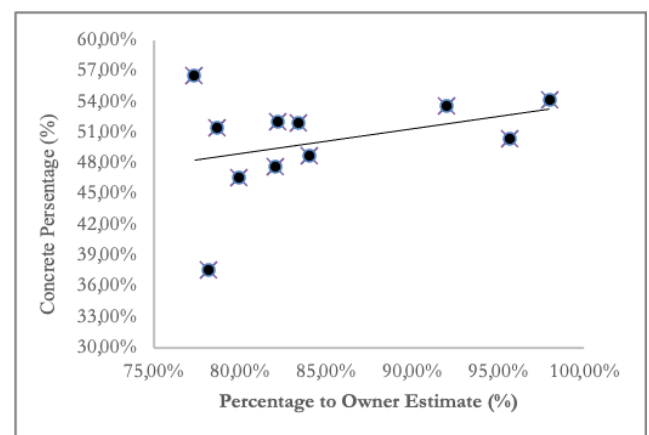


Figure 6: Graph of the relationship between the percentage of offers and the percentage of concrete work

The results of statistical calculations on the factors that affect the percentage of offers to HPS (Y) are the owner's estimate value (X1), the number of bidders (X2), the distance of the work location from the city center (X3) and the percentage of concrete work items (X4). The coefficient of determination of HPS (Y) can be concluded that the number of bidders is the main factor that significantly affects the percentage of bids. Another factor is the distance of the work location from the city center. The percentage of concrete work items and the HPS value has a less significant effect.

3.2 The Effect of Supply on Quality

In the road work package in Grobogan Regency, concrete quality testing was carried out using a destructive test, namely sampling with a core drill. The specimens taken are subjected to a compression test to determine the compressive strength of the stretched concrete test. Testing is carried out as a basis for the owner's payment of service provider work.

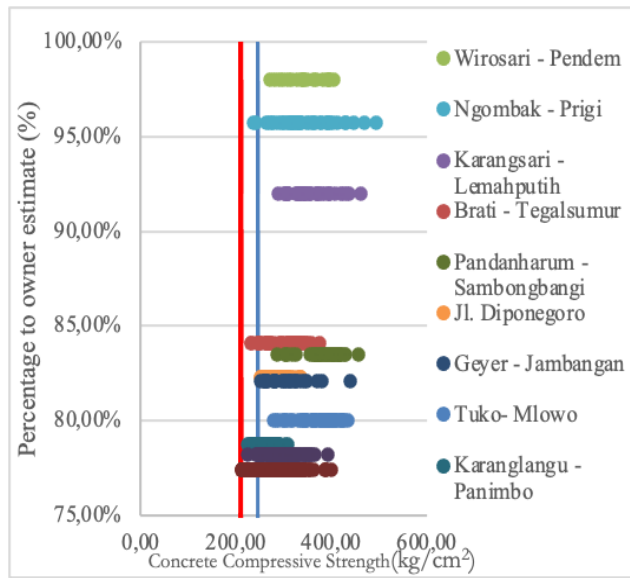


Figure 7: Graph of Relationship between Concrete Compressive Strength and Supply Percentage of the Owner's estimate

From this study, it can be concluded that at bids <80%, the value of the owner's estimate has less good quality compared to jobs with an offer of >80% of the value of the owner's estimate. It can be seen from the number of samples that are not following the compressive strength of the plan; jobs with an offer <80% value of the owner's estimate has many samples that do not match the quality of the plan, which is more significant than jobs with an offer of >80% value of the owner's estimate, even though the work is still in progress. The tolerance limit is paid according to the contract.

3.3 The Effect of Supply on Quantity

When carrying out the destructive test with a core drill, the thickness of the spread concrete will also be obtained. The result of the study is one of the actual payments to be made by the Owner. Payments are made per the volume spread out in the field. The planned thickness is 20 cm.

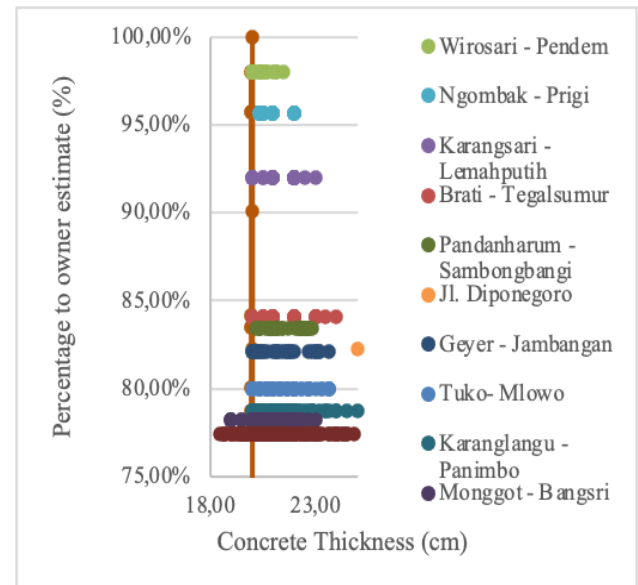


Figure 8: Graph of the Relationship between the Thickness of Lay Concrete and the Percentage of Bidding to the owner's estimate

The results of this study can be concluded that in jobs with an offer of <80%, the value of the owner's estimate has a less good quantity when compared to the number of samples in jobs with an offer of >80%, the value of the owner's estimate. It can be seen from the number of samples in jobs with an offer of <80% of the value of the owner's estimate, which is less than the thickness of the plan, which is more when compared to jobs with an offer of >80%, the value of the owner's estimate. The thickness of the pavement plan is 20 cm.

IV. CONCLUSION

The conclusion can be formulated as follows:

- 1) The number of bidders is the main factor affecting the percentage of bids for concrete road works. Other factors are the distance of the work location from the city center, the percentage of concrete work items, and the owner's estimated value.
- 2) The quality of work with an offer value of <80%, the value of the owner's estimate is lower than work with an offer of >80% of the HPS value. It can be seen from the number of samples that are not by the compressive strength of the plan; jobs with bids <80% of the owner's estimated value have a sample number that does not match the quality of the plan, which is more significant than jobs with an offer of >80% of the owner's estimate value.
- 3) The quantity of jobs with an offer of <80% of the owner's estimated value is lower than that of jobs with an offer of >80%. It can be seen from the number of samples that are less than the thickness of the plan; for

jobs with an offer <80%, the owner's estimate value is higher than for jobs with an offer > 80%, the owner's estimate value.

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