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Analysis of the Effect of Contract Changes Order (Cco) on Cost Overrun in Road Projects Boyolali District APBD 2017-2018

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Abstract**:** *The development of construction projects in Indonesia is experiencing rapid growth. The increase in development creates competition between construction service providers. Good management is needed so that project problems do not arise that have the potential to cause work failures that cause cost overruns. This study aims to identify the factors causing cost overrun on road construction projects in Boyolali Regency in 2017 and 2018. The data used in this study is secondary data, namely data obtained through literature review and literature study from previous research. The secondary data obtained are used to create a new questionnaire sourced from Presidential Decree No. 16 of 2018 articles 54-58 and attachment III B.SDP PK PerMen PUPR No. 14 of 2020 article 36-40 regarding contract changes. The method in this study is to process the results of the questionnaire using the Statistical Package for the Social Sciences (SPSS) version 26 program. The dominant factors that have the most influence on cost overruns are not good at making schedules and resources (X2.1), an increase in material prices (X4 .1), and the addition of the performance factor/capability of the equipment is not optimal (X5.1) with the value of effective contribution (SE), 24.02%, 2.25%, and 6.47%. So the effect on cost overruns is not good in making schedules and resources (X2.1) with an effective contribution value (SE) of 24.02 %.*

Keywords: Road Project,Contract Change Order,Cost Overrun

Introduction

The development of construction projects in Indonesia is experiencing rapid growth in this period. One of the facilities that are developing in Indonesia is transportation facilities. Adequate infrastructure is expected to facilitate the community mobilization process. Encourage the pace of the Regional Economy. Increased development requires proper project management so that the project can run as planned.

There are problems in the project that have the potential to cause work failure, one of which is a change in the contract (Contract Change Order). According to Nursyamsi (2021), a Contract Change Order (CCO) is a change in writing between the owner and the contractor to change the condition of the initial contract document, by adding or reducing the volume of work. CCO greatly impacts the effectiveness of project work where its sustainability depends on three interrelated components. related to quality, time, and cost.

Contract Change Orders can affect several things, one of which is a cost overrun. According to Rizal (1996) Cost Overrun is the difference between actual costs and expected costs at the start of the project. Cost overruns can occur in the early stages, during, or after construction. To avoid these problems, identification of the important and dominant factors that are the cause of the additional cost of the Boyolali Regency APBD road project in 2017 and 2018.

According to Dapu, YC, et all (2016), The aim is to obtain and find out what factors lead to Cost Overruns that affect the increase in the final cost performance of the project. The data collection method used was by distributing questionnaires and respondents to the construction of the Manado North Sulawesi military regional command headquarters building, which is located in the city of Manado. The data processing of this questionnaire used the SPSS (Statistical Package For Social Science) version 22 program. - ranking of each factor that causes cost overruns in project completion. By using an analysis of the factors that are the main causes that influence the excess cost of completing the project for the construction of the Manado regional military command headquarters building, North Sulawesi, which is located in the city of Manado.

According to (Sugiyono, 2016: 135) The population is a generalization area consisting of objects/subjects that have certain quantities and characteristics set by researchers to study and then draw conclusions. according to the repository. A pas sample is part of the population with certain characteristics to be studied.

According to data from the Highways Service of Boyolali Regency, the total length of roads in Boyolali Regency is 678 Km with a total of 203 road sections. According to Indonesian Wikipedia Boyolali is a district in Central Java Province. The administrative center is in Kemiri and Mojosongo, The population of Boyolali Regency is 534,635 people in 2020. The geographical position of the Boyolali Regency area is a strength that can be used as capital for regional development because it is located in the Yogyakarta-Solo-Semarang triangle, the three main cities in the Central Java region and the Special Region of Yogyakarta.

To avoid these problems, identification of the important and dominant factors that caused the additional costs of the Boyolali Regency APBD road project in 2017 and 2018. This research was previously carried out by Muhammad Nur Sahid and Hanif Nanda Saputra (Jurnal Teknik Sipil, 2019) with the research title "Identification of the Dominant Cost Overrun Risk Factors in Boyolali Regency Road Projects in 2017 and 2018". Seeing the potential for the development of this research, this research on the effect of Contract Change Order aims to develop from the previous research. Therefore, the author conducts final project research that is similar to the title Analysis of the Effect of Contract Changes Order (CCO) on Cost Overrun in the 2017-2018 Boyolali District Budget Road Project

This study discusses Contract Change Order factors that affect cost overrun. on road projects in Boyolali Regency with APBD funds for 2017-2018. By knowing the factors that can cause the risk of cost overrun in road construction, the authors hope that service providers and parties related to road construction projects can realize the importance of risk factors that cause cost overrun and can find the right solution to minimize the risk of cost overrun.

Experimental

This study uses questionnaire data from previous research so that it has the same time and place for collecting questionnaire data. The objects in this study are road project contractors who are currently or have completed APBD road construction work in Boyolali Regency in 2017 and 2018. After the secondary data is obtained, it will then be used to create a new questionnaire based on Presidential Decree No. 16 of 2018 articles 54- 58 and Appendix III B.SDP PK PerMen PUPR No. 14 of 2020 articles 36-40 regarding contract changes. The data obtained from the questionnaire were processed using the SPSS version 26 program.

The independent variables in this study were the factors causing the contract change order to cost overrun in the Boyolali Regency APBD road construction project in 2014 2017 and 2018. The dependent variable in this study is the impact/effect of the change order contract, namely the cost overrun on the Boyolali Regency APBD road construction project in 2017 and 2018.

The minimum sample calculation in this study.tables Isaac and Michael, with an error rate of 5%. After obtaining the results of the minimum sample data, the researcher then inputted the data from the questionnaire results and carried out data recapitulation to facilitate further data processing.

Processing of the questionnaire data then uses the SPSS version 26 program, where later the data obtained will go through 4 (four) test stages as follows:

Validity

The test is used to find out whether the questionnaire used in this study can measure exactly what will be studied or not. The validity test is done by calculating the relationship between the sub-variables with the number of each existing variable. Sub-variables can be declared valid if they have a value of rcount > rtable. The validity formula manually is as follows:

$$r_{xy} = \frac{N\sum XY - (\sum X)(\sum Y)}{\sqrt{\{N\sum X^2 - (\sum X)^2\}\{N\sum Y^2 - (\sum Y)^2\}}}$$

where:

rxy = correlation coefficient between variable X and variable Y
X = score obtained by the subject from all items
Y = total score obtained from all items
ΣX = total score in the X distribution
ΣY = total score in the distribution Y
N = number of respondents

Reliability test

The reliability test was carried out after the researcher conducted a validity test. This test was conducted to find out whether or not the answers to the questionnaire were constant in this study. Reliability testing uses the Alpha Cronbach. With the provision that if Cronbach's Alpha > 0.60, the data is declared consistent or reliable. with the following formula:

where:

r11 = reliability value
Σat = sum of the variance of the score of each item

at = *total variance*
n = *number of items*

Classical Assumption Test

After conducting validity and reliability tests, then carry out the classical assumption test as a feasibility test to fulfill the regression model. This classic assumption test includes:

Normality

Test Normality test According to (Singgih Santoso, 2012), the basis for decision-making can be done with probability (Asymptotic Significance). If the probability obtained is > 0.05 then the distribution and a regression model are normal and vice versa if the probability is <0.05 then the distribution and regression model are not normal.

Heteroscedasticity

test The heteroscedasticity test aims to find out that the regression model has variations in the confounding variables. (Gujarati, 2007).

The multicollinearity

The test aims to determine whether there is a strong correlation between the independent variables (X). The number of independent variables (X) in this study amounted to more than one, V Santoso, 2009).

Variable	Item
Cost Estimation Question (X1)	Incomplete project data and information
	Does not take into account the effects of inflation and exclamation
	Does not take into account unexpected costs
	Lack of OSH at the project site
	Inaccuracy in cost estimates
	Compensation costs for disputes around the project/project environment
	Errors in design and *engineering*
Implementation and Work relationship (X2)	Impact of addendum and *CCO*
	New public policy from the government
	Appointment of inappropriate subcontractors and suppliers
	Delay in decision making
	Does not pay attention to location and construction risks
	Not good at making schedules and resources
	Inaccurate in placing project personnel in the organizational structure
Document Aspect (X3)	There are differences in field conditions written in the contract
	Type of contract used

Multiple Linear Regression Test

After the classical assumption test is fulfilled then carry out multiple linear regression analysis tests using data primarily from the results of filling out the questionnaire obtained from the respondents. Data analysis in this study used quantitative methods, which were operated using the SPSS version 26 program. From this analysis, the influencing factors and dominant factors in this study would be obtained. . The mathematical model in multiple linear regression is:

$Y = \alpha + \beta 1X1 + \beta 2X2 + ... + \beta nXn + e$

where:

Y = *dependent variable (dependent)*
X = *independent variable (free)*
α = *constant*
β = *regression coefficient*

Selection Questionnaire

Table V.1 Factors Affecting Additional Costs

Variable	Item Question
Material (X4)	There is an increase in material prices
	Use of imported
	materials Theft of materials/ materials
	Damage to materials/materials
	Delays in the supply
of labor materials (X5)	Shortage of labor Labor
	productivity bad
	work Enforcing overtime too often
Equipment (X6)	High equipment rental prices
	Maintenance costs are not according to the plan
	High costs for mobilizing/ demobilizing equipment
	Transportation to difficult project locations
	Performance/capability of equipment is not optimal
Project Finance (X7)	Poor cost control
	Inaccurate fund disbursement system
	High interest rates on bank loans
Execution time (X8)	Lack of materials material at the time of implementation
	There was a delay in the schedule due to the influence of the weather
	The occurrence of natural disasters
Field Arrangements (X9)	Limited area of the project
	Lack of provision of field support facilities (communication equipment, water supply, and generators)

The questionnaire that affect the change order contract is carried out based on Presidential Regulation Number 16 Article 54 of 2018 and Appendix III B. SDP PK PerMen PUPR No. 14 of 2020 articles 36-40 regarding contract changes. After sorting based on these regulations, the following questionnaire results were obtained:

Table V.2. Factors Influencing CCO

FACTORS INFLUENCING *CONTRACT CHANGE ORDER*		
Bound Variable	Question	
X1 Cost Estimation	X1.1 Incomplete	project data and information (working drawings, technical specifications) (Perpres No. 16 of 2018 article 54 paragraph 1c)
	X1 .2	Errors in design and engineering calculations (Presidential Decree No. 16 of 2018 article 54 paragraph 1 & Appendix III B. SDP PK PerMen PUPR No. 14 of 2020 article 37. Change of Work paragraph 1c)
Relations & Work Implementation	X2.2	Less appropriate in the placement of project personnel in the organizational structure (Attachment III B. SDP PK PerMen PUPR No. 14 of 2020 article 40. Changes in managerial personnel and/or main equipment paragraph 3)
X3 Aspects of Project Documents	X3.1	There are differences in written field conditions in the contract (Perpres No. 16 of 2018 article 54 paragraph 1)
X4	X4.1	There is an increase in material prices (Attachment III B. SDP PK PerMen PUPR No. 14 of 2020 article 38. Price changes paragraph 1c)
Material	X4.2	Usage of which materials imported (App. III B. SDP PK PerMen PUPR No. 14 of 2020 article 38. Price changes paragraph 6f)

X5 Equipment	X5.1	Equipment performance/capability is not optimal (Attachment III B. SDP PK PerMen PUPR No. 14 of 2020 article 40. Changes in managerial personnel and/or main equipment paragraph 2)
X6	X6.1	There is a delay in the schedule due to the influence of the weather (Appendix. III B. SDP PK PerMen PUPR No. 14 of 2020 article 41. Force Majeure paragraph 1)
Execution Time	X6.2	The occurrence of a natural disaster (Appendix III B. SDP PK PUPR Ministerial Regulation No. 14 of 2020 article 41. Force Majeure paragraph 1)

So, after sorting out the questionnaire, 10 questions were obtained that affected the change order contract out of a total of 38 questions on the factors that cause cost overruns.

Finding and Discussion

Validity test results The validity

test in this study with a sample size of 55 and an error rate of 5% obtained an r table value of 0.2609. The rtable value can be seen in the attachment. The following are the results of the validity test:

Variable	Value of rcount	Value of rtable	Value of Sig.	Decision
x1.1	1,000	0.2609	0,000	Valid
0.2609	0.103	x1.2	0.454	Valid
invalid x2.1	1,000	0.2609	0,000	Valid
x2.2	0.615	0.2609	0,000	Valid
x3.1	1,000	0.2609	0,000	Valid
x4.1	1,000	0.2609	0,000	x4.2
0.325	0.2609	0.	0.015	Valid
X5.1	1.000	0.2609	0.000	Valid
X6.1	1.000	0.2609	0.000	Valid
X6.2	0.177	0.2609	0.196	Invalid

Table V.3. Contract Change Order Validity Test Results

Based on the results of testing the validity of the Pearson product moment factor influencing the change order contract on the cost overrun above, it can be concluded that of the 10 questionnaire items that were declared valid there were 8 items, while the invalid variables were variables (X1.2) and (X6.2). Because it has a value of rcount < rtable, it is declared invalid. A questionnaire is said to be valid if the value of $\alpha < 0.05$ and rcount> rtable means that it is declared valid. For invalid questionnaire items, they are not included in further testing.

Reliability Test Results

After the questionnaire items were declared valid, a reliability test was carried out which aimed to determine the consistency of the questionnaire if measurements were carried out with the questionnaire being repeated.

Table V.4 Contract Change Order

Reliability Test Results Reliability Statistics	
Cronbach's Alpha	*N of Items*
0.667	8

Based on the reliability test above, there are 8 items with a Cronbach's Alpha value of 0.667 > 0.6 so that the variable is declared reliable and further tests can be carried out

Classical Assumptions Test

Results The classical assumption aims to determine whether or not there is a deviation from the classical assumption. The classic assumption test consists of a normality test, a multicollinearity test, and a heteroscedasticity test. The results of the normality test can be seen in the following figure:

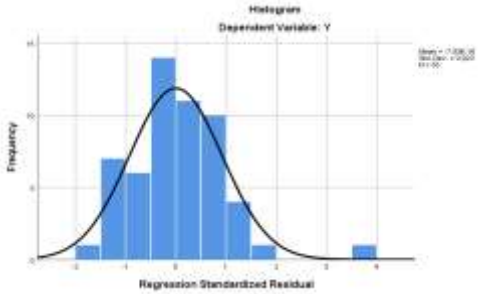


Figure V.1 Normality Histogram Diagram

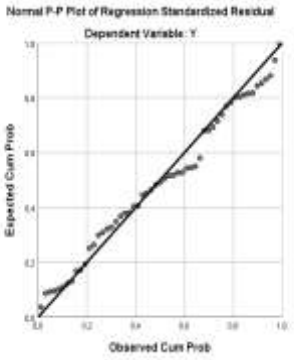


Figure V.2 *Normal PP Plot of Regression Standardized*

One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		55
Normal Parameters[a,b]	Mean	,0000000
	Std. Deviation	,66397791
Most Extreme Differences	Absolute	,100

	Positive	,100
	Negative	-,051
Test Statistics		,100
Asymp. Sig. (2-tailed)		,200[c,d]

Figure V.3 *One-Sample Kolmogorov-Smirnov Test*

Based on normality histogram diagrams and *normal pp-plot regression* visually standardized and *asymp values. sig.* on the *Kolmogorov-Smirnov test* > 0.05, the research data has a normal distribution

of multicollinearity test results.

A good regression model should not have a correlation between the independent variables (Ghozali, 2013). The basis for decision making on the multicollinearity test with the *Tolerance* value and the VIF (*Variance Inflation Factor*) value is as follows:

Based on the *Tolerance*:

if the *Tolerance* > 0.1 it means that multicollinearity does not occur in the regression model.

if the *Tolerance* <0.1 it means that there is multicollinearity in the regression model.

Based on the VIF (*Variance Inflation Factor*) value:

if the VIF value is <10, it means that there is no multicollinearity in the regression model.

if the VIF value > 10 means that there is multicollinearity in the regression model.

The multicollinearity test results are as follows:

Table V.5 Multicollinearity Test Results

Variabel	*(VIF)*	*Tolerance*	Keterangan
X1.1	1,254	0,798	Non Multikolinieritas
X2.1	1,952	0,512	Non Multikolinieritas
X2.2	1,789	0,559	Non Multikolinieritas
X3.1	1,122	0,891	Non Multikolinieritas
X4.1	1,638	0,611	Non Multikolinieritas
X4.2	1,381	0,724	Non Multikolinieritas'
X5.1	1,272	0,786	Non Multikolinieritas'
X6.1	1,412	0,708	Non Multikolinieritas'

Based on the results in the table above it can be seen that the VIF value for of all independent variables is less than 10 and the *tolerance* all independent variables is more than 0.1 so it can be concluded that there are no multicollinearity symptoms.

The test results

test aims to assess whether there is an inequality of variance from the residuals for all observations in the linear regression model.

if the significance value (sig.) > 0.05 then the conclusion is that there are no symptoms of heteroscedasticity in the regression model. conversely, if the significance value (sig.) < 0.05 then the conclusion is that symptoms of heteroscedasticity occur in the regression model.

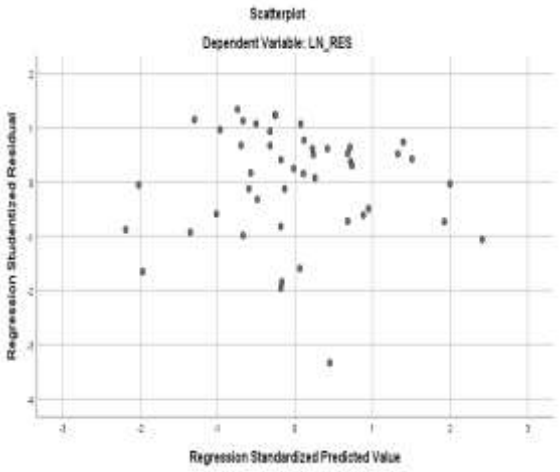
The results of the heteroscedasticity test are as follows:

Park test

As an alternative to find out whether the data has heteroscedasticity or not, it can be done using the Park test. The working principle of this park test is by regressing the residual value (LN_Res) with each independent variable. Here are the results of the park test.

Table V.8 Park Test Results

Variable	Value Sig.	Description
X1.1	0.741	Non Heteroscedasticity
X2.1	0.108	Non Heteroscedasticity
X2.2	0.230	Non Heteroscedasticity
X3.1	0.903	Non Heteroscedasticity
X4.1 0.683	0.895	Heteroscedasticity
X4.2	Non	Heteroscedasticity
X5.1	0.150	Non
X60	.	Non



HeteroscedasticityV.5 *Scatterplot Error* Park Test

After the park test is carried out, the data is spread evenly above and below or around the number 0, the dots do not gather only above and below and the distribution of the dots does not form a specific pattern such as wavy/funnel, form widened and then narrowed or form a parallel line. So it can be concluded that there are no symptoms of heteroscedasticity.

In cases like the above, there are several ways that can be done to be free from symptoms of heteroscedasticity. The alternative solutions that can be done are as follows:

Perform other alternative tests to detect whether there are symptoms of heteroscedasticity (such as: *Spearman's rank* test, *park* test, and *white*).

Perform research data transformation (eg: Ln, Log10, Lag, etc.).

Make *outliers* for extreme data or if necessary, we may add new samples so that the data distribution becomes more varied or diverse.

Test *Results* of Multiple Linear Regression Analysis Multiple

Linear regression analysis aims to determine the effect of two or more independent variables (X) on the dependent variable (Y). With this analysis, we can predict the behavior of the dependent variable using independent variable data.

The results of multiple linear regression tests in this study are as follows:

Simultaneous Significance Test Results (F

Test) Simultaneous test (f test) is used to determine the effect of all independent/free variables included in the regression model simultaneously (together) on the dependent variable / is bound by using a 95% level of confidence (e = 5%) tested at a significance level of 0.05. The test is carried out using the F distribution test, namely by comparing the critical value of F (f table) with the calculated f value contained in the ANOVA table. To find the value of f table using the formula f table = (k; nk). With values k = 8 and n =55 . So f table = (8; 55-8) = (8; 47) and by looking at the distribution table for the value of f table, the value of f table is 2.14 and the hypothesis can be tested as follows:

Tabel V.9 Hasil Uji F Simultan Faktor-Faktor CCO

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13,175	8	1,647	3,182	,008
	Residual	23,807	46	,518		
	Total	36,982	54			

a. Dependent Variable: Y

Based on the *output* above, it is obtained $p_{value} p_{value}$ 0.001

Results

Because $p_{value} = 0{,}001 < \alpha = 0{,}05 p_{value} = 0{,}001 < \alpha = 0{,}05$ and the value of f count = 3.182 > f table = 2.14 then it is $H_1 H_1$ accepted, so that there are independent variables that have a significant effect on cost overruns for APBD road projects in Boyolali Regency in 2017 and 2018.

Individual parameter significance test results

(t test)

A partial test (t) test was conducted to see whether each independent/free variable partially (on its own) had an effect on the dependent/bound variable by looking at the *output* data results in multiple linear regression analysis. To find the t table value, use the t table formula = (a/2; nk-1). With a value = 0.05, n = 55, k = 8. So = t table = (0.05/2; 32-6-1) = (0.025; 46) and by looking at the distribution table the value of t table is obtained t table of 2.013.

Table V.10 Partial T Test Results for CCO Factors

Model	*Unstandardized Coefficients*		*Standardized Coefficients*	T	Sig.
	B	*Std. Error*	beta		
(*x1.1*)	0.628	-0.364		1,132	0.263
0.555	0.018	0.093	0.026	3.388	0.194
x2.1	0.415	0.122	0.560	x2.2	0.001
_	-0.455	-2.873	0.127	x3.1	0.006
_	-	_	_	_	0.8

					47
constant	0.074	0.133	x4.2	0.557	0.580
x5.1	0.045	0.109	0.057	0.411	0.683
x6.1	0.150	0.092	0.218	1,633	0.109
0.087	0.073	0.522	0.604	In	addition

to see the significance value can also compare the value of t table with t count, if t arithmetic> t table, the variable has a significant effect. In the ANOVA test results obtained df residual 46 so to find t table can be seen in the distribution table t = (a/2; nk-1) = (0.05/2; 46-8-1) = (0.025; 36) obtained t table of 2.028. The results of the t test can be seen in the following table.

Table V.11 T Test Results CCO Factors

V	α	pvalue	t table	Tcount	Ket.
X1.1	0.050	0.847	0.194	-2.2.873	TBS
x2.1	0.050	0.001	2,028	x2.2	x3.1
_	0.050	0.006	2,028	_	TBS
_	0.050	0.285	2,028	-1.081	TBS
x4.1	_	0	.	_	_
_	_	_	Bs	2,028	3,388
X5.1	0.050	0.109	2.028	X6.1	FFB
Affected	0.050	0.604	2.028	0.522	FFB

Description:
FFB = Not Significantly
. Significantly

Coefficient of Determination Test $(R^2)(R^2)$

Table V.12Coefficient of Determination of CCO Factors

Model Summary[b]

a. Predictors: (Constant), X6.1, X1.1, X3.1, X5.1, X4.2, X2.2, X4.1, X2.1
b. Dependent Variable: Y

Based on the table above, the R *square* 0.356. This means that the influence of the independent variable (X) on the dependent variable (Y) that can be explained by the regression is 35.6% and the remaining 64.4% is an effect that cannot be explained by the regression. It could be due to other factors that were not found in this study.

Equation of Multiple Linear Regression Analysis

Based on table V.10, the CCO factor regression model equation can be obtained by looking at the constant and coefficient values, so that in this study a regression equation can be obtained from the results of data processing with the help of the SPSS application program version 26 of 2019 as follows:

Equation multiple linear regression of CCO factors:

Y = 0.628 + 0.018X1.1 + 0.415X2.1 - 0.364X.2.2 - 0.090X3.1 + 0.074X4.1 + 0.045X4.2 + 0.150X5.1 + 0.045X6. 1 + 0.555

Discussion of Multiple Linear Regression Analysis Equation

Based on the analysis of the multiple linear equations that have been carried out, it is found that the dominant factor is very influential on cost overruns in the APBD road project in Boyolali Regency in 2017 and 2018, namely in the relationship aspect and work implementation with the factor (X2. 1) that is not good at making schedules and resources, there are differences in field conditions written in the contract and equipment factors (X5.1), namely performance / equipment capabilities are not optimal.

Value *Pearson Correlation* Multiple Linear Regression Analysis

The purpose of analyzing the *Pearson correlation* of multiple linear regression is to find out the relationship between variables and to determine the dominant factor from the t test that causes cost overruns in APBD road projects in Boyolali Regency in 2017-2018. The following table shows the *Pearson correlation* multiple linear regression CCO factor.

Table V.12 *Pearson Correlation* CCO Factor

Variable	*Pearson Correlation*
X1.1	0.429
0.118 X2.1	X2.2
0.045	X3.1
-0.093	X4.1
0.269	X4.2
0.241	X5.1
-0.297	X6.1
0.267	From

The table above the values *Pearson correlation* factor *contract change order* above, it can be concluded that the 2 dominant factors of the 2 highest values are) namely the relationship and work performance with the factor (X2.1) and the existence of an increase in material prices (X4.1).

Dominant Factors *Contract Change Order* (CCO)

At this stage, 3 samples were taken with dominant values from several tests except for the t test. The test results are as follows:

a. A Partial test of individual parameters (t test)
   Based on individual parameter t tests, the dominant factor causing the *contract change order* (CCO) is not good at making schedules and resources (X2.1), and adding performance factors/equipment capability is not optimal (X5.1)
b. Linear regression equation
   Based on the analysis of the linear regression equation that has been carried out, it is found that the dominant factor is not good at making schedules and resources (X2.1), and the addition of performance factors/equipment capabilities is not optimal (X5. 1)
c. value Pearson *correlation*

Based on the table *Pearson correlation* is not good at making schedules and resources (X2.1), There is an increase in material prices (X4.1).

Based on the analysis above, it is found that the most dominant factor causing project cost overruns on APBD roads in Boyolali District APBD for 2017 and 2018 can be seen in the following figure.

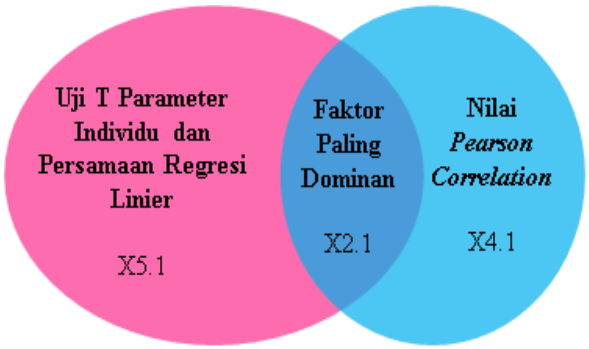


Figure V.6 Dominant Factors of Contract Change Order (CCO)

From the results of the t test, multiple linear regression equations, and Pearson correlation values, it is obtained that the equation of the most dominant factor causes Contract Change Order (CCO) to Cost Overrun (CO), which is not good in the preparation of schedules and resources (X2.1)

Determination of the Amount *of Contract Change Order* 24 _ _

_ _ _

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$$\text{Sumbangan Efektif (SE)} = \frac{\text{Koefisien Regresi } (\beta)}{\text{Koefisien Korelasi}} \text{x100\%}$$

a. _
_ _ .02%
X5.1 = additional equipment performance/capability factors are not optimal 6.47%

b. results of multiple linear regression equations
X2.1 = not good at making schedules and resources 24.02%
X5.1 = additional equipment performance/capability factors are not maximum 6.47%

c. value *Pearson correlation*
X2.1 = not good at making schedules and resources 24.02%
X4.1 = There is an increase in material prices 2.25%

Of all the independent variables (X) the most dominant in influencing cost overruns in APBD road projects in Boyolali Regency in 2017 and 2018 were not good at making schedules and resources (X2.1), that is, there were differences in field conditions written in the contract of 24.02%.

Conclusion

After conducting this research, the CCO factors that influenced the Cost Overrun on the Boyolali Regency road project in the 2017-2018 APBD are obtained:

a. t test results

X2.1 = Not good at making schedules and resources 24.02%

X5.1 = Addition the performance factor/equipment capability is not optimal 6.47%

b. The result of the multiple linear regression equation

X2.1 = Not good at making schedules and resources 24.02%

X5.1 =Additional equipment performance/ability factor is not optimal 6.47%

c. value Pearson correlation

X2.1 = Not good at making schedules and resources 24.02%

X4.1 = There is an increase in material prices of 2.25%

Of all the independent variables (X) which is the most dominant in influencing

cost overruns in APBD road projects in Boyolali Regency in 2017 and 2018 is not good at making schedules and resources (X2.1), namely there is a difference in field conditions written in the contract of 24.02%

Through the analysis that has been carried out, it is found that the dominant factor g affects Cost Swelling (Y) for Road Projects in Boyolali Regency is Not good at making schedules and resources (X2.1) with a coefficient of 0.560

Based on the value of the coefficient of determination shown with a value of 0.356. The magnitude of the effect of CCO on Cost Overrun(CO) or cost overruns that can be explained by the regression is 35.6% and the remaining 64.4% is an effect that cannot be explained by the regression.

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