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Analysis of Factors Causing Contract Change Order and Influence on Performance of Implementation Time Road Construction Project in Poso Regency

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Abstract: In the process of implementing road construction projects, especially in Poso Regency, changes are often made to adapt to local conditions. These changes can impact changes to existing contract agreements, so that it is necessary to issue a new addendum or contract change order. This research sought to evaluate the impact of contract change orders on execution time performance as well as to identify tactics to prevent contract change orders from occurring during the implementation of road construction projects in Poso Regency. 52 individuals, including proprietors, consultants, and contractors, participated in the study. Documentation, interviews, and questionnaire surveys were used to acquire data. Data analysis via Structural Equation Modeling revealed that the origin of contract change orders had a positive value and significantly impacted implementation time. In order to prevent change orders from being issued during road construction projects in Poso Regency, it is necessary to thoroughly survey and inspect the area prior to design, prepare comprehensive, clear, and unambiguous contract documents, prepare specifications clearly, in detail, and without providing opportunities for different interpretations, the selection of qualified workers including certified experts and experienced operators, and ensure that budget policies and project planning are stable from the start, so that there are no changes in priorities that impact revisions to the scope of work.

Keywords: *Construction, Road, Contract Change Order, Implementation Time Performance, SmartPLS.*

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I. INTRODUCTION

In Indonesia, the procedure known as a Contract Change Order (CCO) or Contract Change is a formal method undertaken to modify the terms of a contract concerning construction projects, consulting services, and the acquisition of goods or services within either the public or private domains. [1]. For the implementation of Contract Change Orders (CCO) in Central Sulawesi province, there are essentially no local regulations that differ from national regulations. However, in the practice of project implementation in Central Sulawesi, several local characteristics often cause Contract Change Orders (CCO), including complex geographic and topographical conditions, changes in field conditions during project implementation, limited access to materials and heavy equipment, adjustments due to extreme weather, and the need to adapt designs to soil conditions and disasters. Furthermore, following the earthquake, liquefaction, and tsunami that struck several areas of Central Sulawesi, many construction projects required technical adjustments and implementation methods, making contract changes quite common in construction implementation in the region. These changes can include the scope of work, costs, implementation duration, work methods, and technical specifications [2]. In the execution of road building initiatives, particularly in Poso Regency, modifications are frequently necessary to suit the circumstances present in the area. This adjustment can affect the agreement in the applicable contract, so that it is necessary to make a new addendum, whether related to the implementation schedule, an addendum regarding work details, or due to changes in the contract value.

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The purpose of this study is to determine the dominant factors causing the occurrence of contract change orders (CCO), to determine the effect of contract change orders (CCO) on implementation time performance, and to determine strategies for preventing the occurrence of contract change orders (CCO) in the implementation of road construction projects in Poso Regency.

II. LITERATURE REVIEW

Numerous ideas and reviews of existing literature that pertain to and endorse the subject of the study are listed below:

➢ *Road Construction Project*

Land transportation facilities include roads, which cover every element of the road, including supporting buildings, extra structures, and all machinery utilized for traffic [3]. These structures can be located on the ground surface, underground, underwater, or above water, except for railways, lorry tracks, and cableways. Based on their function, public roads are grouped into several categories: neighborhood roadways, collector roads, local roads, and arterial roads [4].

➢ *Contract Change Order(CCO)*

*Contract Change Order*A (CCO) is a formal request for change made through a written document between the owner and contractor to modify a number of provisions in a previously agreed contract agreement, such as adding or removing work [5]. These changes can affect the details of the contract costs as well as payment times and the project schedule. Construction projects show that delays in completion schedules are the main problem caused by Contract Change Orders (CCOs), while other issues include claims, disputes, cost overruns, and worker motivation. In general, change orders can significantly impact a project.

➢ *Causes of Contract Change Order (CCO)*

The reasons for a Contract Change Order (CCO) might differ greatly based on several circumstances. The reasons for a change order vary across construction projects. These elements can come from either the user of the service or the provider of the service. Causes of a Contract Change Order (CCO) that are not directly related to the individuals involved in the construction project include weather conditions, health and safety issues, economic fluctuations, socio-cultural factors, and unforeseen issues [6]. While the underlying reasons for a Contract Change Order (CCO) may be strong, the owner's position in the cost and time negotiations with the contractor is less robust than it was when the contract was still in the signing stage. Therefore, when faced with a scope change, the owner should be well prepared, starting by evaluating whether the change is truly necessary and, if necessary, working to minimize its impact on cost and schedule [7].

➢ *Effect of Contract Change Order (CCO)*

The impact of a Contract Change Order (CCO) on project implementation can be divided into three categories: direct costs, time extensions, and impact-related costs [8]. A change order in a construction project can lead to lost productivity.When productivity is lost, it usually causes more time and higher costs for the project. When a Contract Change Order happens, the project may need more workers and more equipment. [9]. Changes in work have negative consequences for the project, where not only is the work process disrupted but also requires adjustments to the time after the change is made.

➢ *Impact of Contract Change Order (CCO)*

If contract change orders are not handled well, they can have a big effect on construction projects., including increased construction costs, delays in completing work, decreased work efficiency, and the emergence of disputes between contractors and owners, as well as various other problems.

➢ *Execution Time Performance*

A project's time-performance reflects how effectively it meets the deadlines set in the agreement [10]. In the context of road construction, time is crucial because it directly relates to community mobility, operational expenses, and the social and economic impacts on the surrounding area. Project assessments are based on three interrelated factors: time, cost, and quality. Failure to meet deadlines often leads to increased costs and potential contract disputes. The CCO has the ability to impact project outcomes, particularly those related to time, budget, and quality, which can have various impacts on project implementation [11]. Here are four effects the CCO has on time-performance regarding project time, cost, and quality:

- Extension of Project Implementation Time
- Project Completion Delay Occurs
- Project Cost Overrun
- Decrease in Quality or Efficiency of Work Quality

III. RESEARCH METHODS

➢ *Research Location*

The research locations for several road construction projects in Poso Regency are:

- Handling of the Long Segment of the Watumaeta - Sangginora DAK Section
- Reconstruction of the Hae – Sangginora Road Section (Fiscal Year 2024)
- Sangginora – Kasiguncu Periodic Rehabilitation (Fiscal Year 2024)
- Construction of the Tentena – Korobono Road Section (2024 Fiscal Year)
- Sangginora – Kasiguncu Periodic Maintenance (Fiscal Year 2024)
- Periodic Rehabilitation of the Sangginora – Kasiguncu Road Section (2024 Fiscal Year)
- Reconstruction of the Hae – Sangginora Road Section (Fiscal Year 2025)
- Rehabilitation of the Sangginora – Kasiguncu Road Section (Fiscal Year 2025)
- Routine Maintenance of Poso Regency Roads (Fiscal Year 2025)

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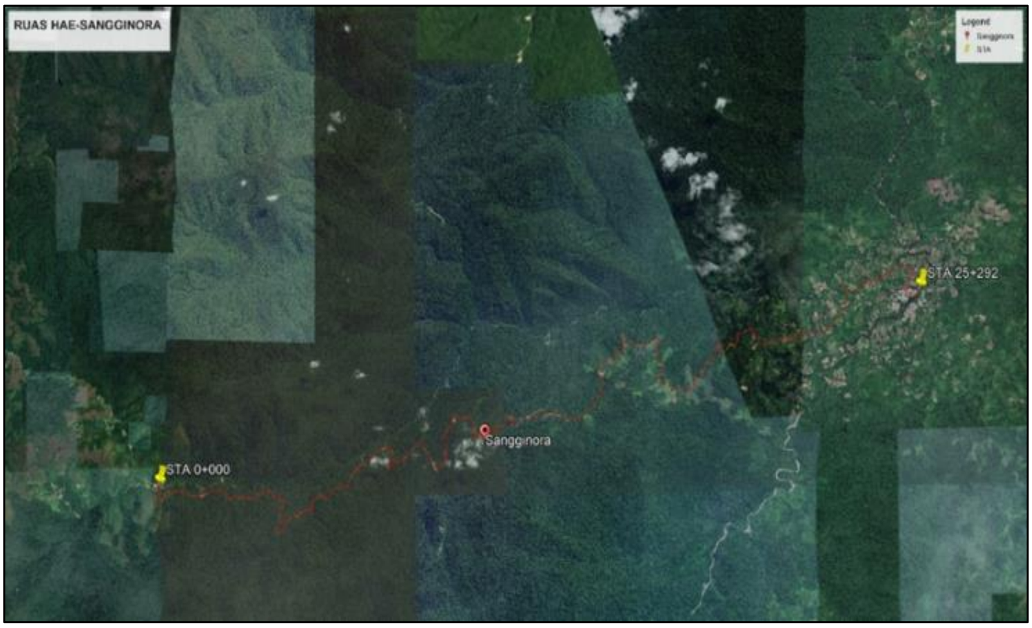

Fig 1 Research Location for Reconstruction of the Hae – Sangginora Road Section

Fig 2 Research Location for the Sangginora – Kasiguncu Road Rehabilitation Section

- *Data Collection Techniques*

The approach to gathering data in this research utilizes two methods for managing data, specifically:

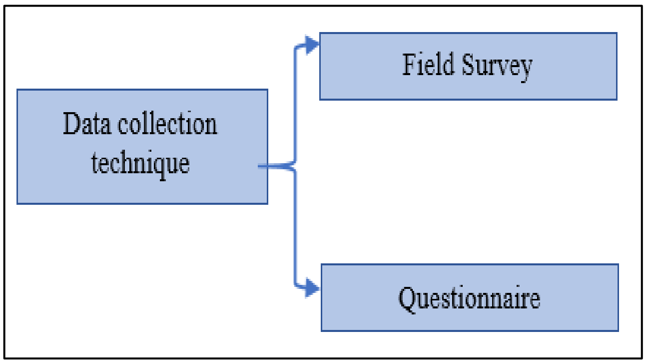

Fig 3 Data Collection Process

- *Research Instruments*

Two main things influence how good the research results are: the quality of the tools used and how well the data is collected. The tool used for this study was a survey. In quantitative research, the quality of the tool depends on how well it measures what it's supposed to, and the quality of data collection depends on how accurately the data is gathered using the methods used. Tools used in quantitative research include assessments, interview frameworks, observation protocols, and surveys. A survey serves as a method for information gathering by presenting a sequence of written queries or statements for participants to respond to. The tool chosen for this research strives to yield precise and reliable data by employing the Likert Scale, which assesses the attitudes, beliefs, and viewpoints of individuals or groups regarding a social issue. Below is a description of the five levels on the Likert Scale.

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Table 1 Questionnaire Answer Criteria

No.	Assessment criteria	Likert Scale
1.	Very Ineffective	1
2.	No effect	2
3.	Quite Influential	3
4.	Influential	4
5.	Very influential	5

➢ *Research Respondents*

The total participant count in the study regarding the execution of road building initiatives in Poso Regency stood at 52 individuals, as illustrated in Table 2. of the results of determining research respondents.

Table 2 Results of Determining Research Respondents

No.	Target Respondents	Sample
Owner		
1.	Commitment Making Officer	1
2.	Field supervisor	8
3.	Assistant Field Supervisor	8
4.	Technical Assistant	3
Consultant Party		
5.	Consulting Director	8
6.	*Site Engineer* Consultant	8
Contractor Party		
7.	Contractor Director	8
8.	*Project Manager* Contractor	8
Amount		**52**

➢ *Data Analysis*

- *Descriptive Statistics*

The descriptive method is an approach applied to describe or analyze an event in research based on visible facts or existing realities [12]. This approach gives us information about the factors that lead to contract change orders and how they impact the efficiency of road construction projects in Poso Regency.

- *SEM Analysis Using Smart PLS Software*

Structural Equation Modeling is a statistical method that looks at several variables together, and it helps to understand how these variables are connected based on a set of ideas or theories. [13]. SEM combines factor analysis, path analysis, and linear regression. Smart PLS is software designed to simplify the SEM analysis process, particularly using Partial Least Squares (PLS). Examples of basic steps in using SEM-PLS are:

- ✓ Data Preparation in Excel
- ✓ Create a New Project
- ✓ Importing Data
- ✓ Data Import Results Display
- ✓ Creating a Path Model Image for a New Analysis
- ✓ Grouping Path Model Images for New Analysis
- ✓ Creating Connecting Lines Between Variables
- ✓ Calculate - PLS Algorithm
- ✓ *Construct Reliability And Validity*
- ✓ *Calculate – Bootstrapping*
- ✓ The results of the bootstrapping calculation will be displayed.

SEM analysis with SmartPLS is a good method for looking at how different factors are connected in a research project. The process includes checking if the model is accurate and dependable so that the results of the analysis can be trusted. Here is a design diagram showing how the partial least squares (PLS) algorithm works.

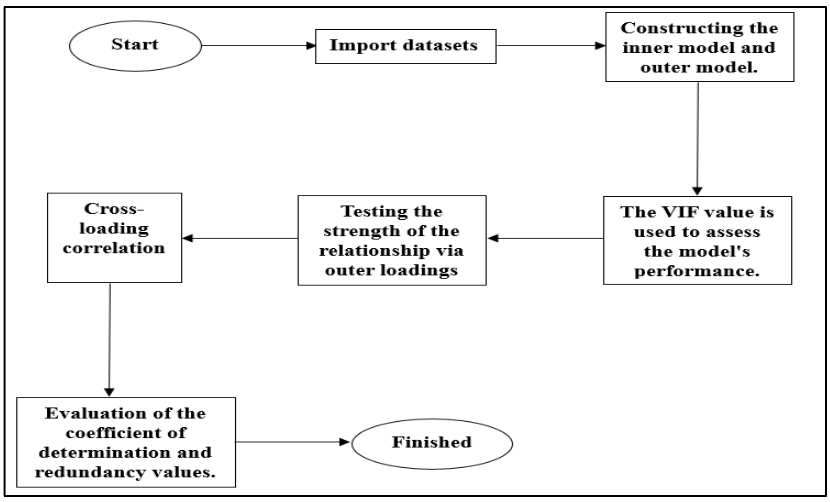

Fig 4 Flowchart of the PLS Algorithm

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Smart PLS offers flexibility in managing latent variables, is easy to use, and allows for significance testing through bootstrapping without the need for distributional assumptions, making it highly suitable for exploratory research in various fields [14]. However, this method also has limitations, such as the lack of a standard Goodness of Fit (GOF) index and potentially different results compared to covariance-based SEM methods like AMOS or LISREL. Nevertheless, its ability to analyze complex models with limited data remains a favorite choice among many researchers [15].

IV. RESULTS AND DISCUSSION

The construction endeavor referenced in the thesis revolves around a road reconstruction initiative in Poso Regency, focusing on the Watumaeta – Sangginora Section, the Hae – Sangginora Section, the Sangginora – Kasiguncu Section, and the Tentena – Korobono Section. The author employs a data analysis method known as Structural Equation Modeling (SEM-PLS) utilizing the Smart PLS Software application for this research. In compiling this study, a questionnaire was used as the primary method for gathering information. This questionnaire was distributed among the Commitment Making Officer, Field Supervisor, Assistant Field Supervisor, Technical Assistant, Consultant Director, Site Engineer Consultant, Contractor Director, and Contractor Project Manager. Looking at the responses from the questionnaires, we found out what factors lead to contract change orders (CCO) and how these change orders affect how well time is managed during road construction projects in Poso Regency.

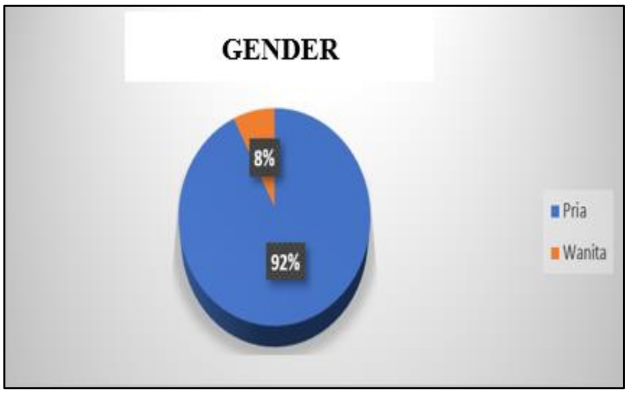

Fig 5 Respondent Gender Diagram

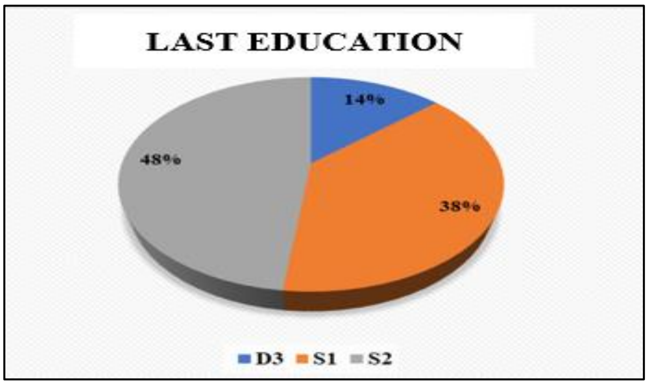

Fig 6 Respondents' Last Education Diagram

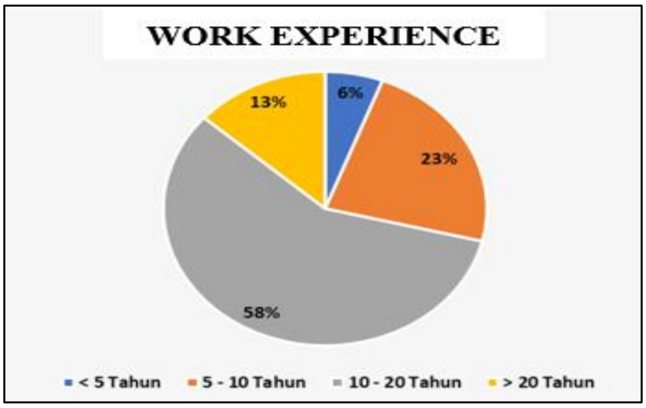

Fig 7 Work Experience Percentage Diagram

✓ *Instrument Testing (Model Evaluation)*

- *Measurement Model Test (Outer Model/ Measurement Model)*

In the analysis using Structural Equation Modeling with the Partial Least Squares approach, the first step is to check the measurement model, which is also called the outer model. The goal of this evaluation is to check if the variables chosen for the study can properly and consistently represent the underlying concept they are meant to measure. In other words, the outer model analysis aims to determine whether each indicator in the questionnaire is truly capable of measuring the variable being studied.

Several criteria that must be met according to SmartPLS 4.0 to conduct the Measurement Model Test (Outer Model / Measurement Model) are explained in the table below:

Table 3 Outer Model Test Requirements

Test Type / Criteria	Indicators / Parameters	Valid / Reliable Criteria	Results
Convergent Validation Test	Loading Factor Values for Each Indicator	Valid if the loading factor value for each indicator is above 0.6	√
	AVE (Average Variance Extracted) Value	Valid if the AVE value for each indicator is above 0.5	√
Discriminant Validation Test	*Cross Loading*		√
	Fornel-Lacker		√
	HTML Value for Each Variable is Below 0.9		√
Reliability Test	Composite Reliability Value	*Reliable*If the Composite Reliability Value for Each Variable is Above 0.7	√
	Cronbach's Alpha Value	*Reliable*If the Cronbach's Alpha value for each variable is above 0.6	√

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In this study, the measurement model was evaluated using five independent variables and one dependent variable, specifically:

✓ *Independent Variables*

- X1 : Construction factors
- X2 : Contract administration factors
- X3 : Technical specification factors
- X4 : Resource factors
- X5 : Policy factors

✓ *Dependent Variable*

- Y : Execution time performance

✓ *Convergence Validation Test of Loading Factor Values*

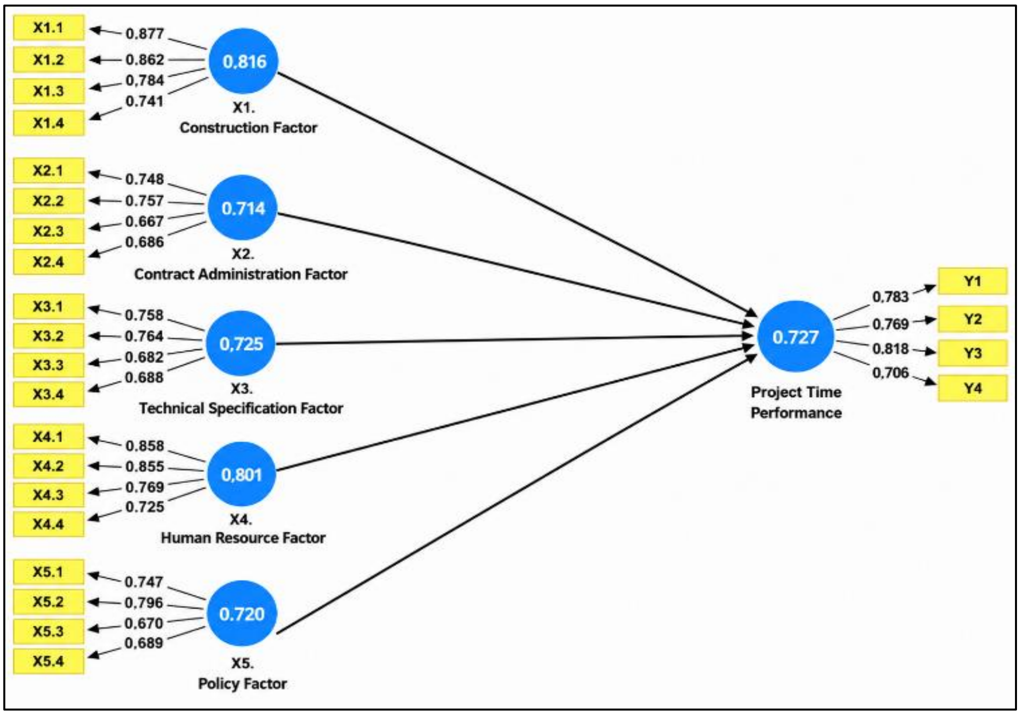

Fig 8 Outer Model

The research results show that the values showing how much each indicator is connected to the variables—like the independent factors such as construction, contract management, technical specifications, resources, and policies, and the dependent factor which is the time it takes to complete the project—are all higher than 0.6. Consequently, these findings effectively validate that the research tool is capable of accurately assessing each variable, making the data appropriate for the subsequent structural model analysis (inner model).

✓ *Convergence Validation Test of AVE (Average Variance Extracted) Value*

Table 4 AVE (Average Variance Extracted) Value

		Average variance extracted (AVE)	**Information**
X1.	Construction factors	0.734	Valid
X2.	Contract administration factors	0.658	Valid
X3.	Technical specification factors	0.693	Valid
X4.	Resource factors	0.725	Valid
X5.	Policy factors	0.661	Valid
Y	Execution time performance	0.710	Valid

The findings from the research indicate that the analysis of convergent validity through the average variance extracted (AVE) metric demonstrates that every research variable possesses a significant degree of precision.

The table shows the AVE value for each independent variable (construction factor, contract administration factor, technical specification factor, resource factor, and policy factor) and the dependent variable (implementation time performance) is in the range of 0.658 to 0.734, exceeding the minimum standard of 0.50. Therefore, the variables used in the test have met the specified requirements.

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✓ *Discriminant Validation Test of Cross Loading Value*

Table 5 Cross Loading Value

	Construction Factors (X1)	**Contract Administration Factors (X2)**	**Technical Specification Factors (X3)**	**Resource Factors (X4)**	**Policy Factors (X5)**	**Execution Time Performance (Y)**
X1.1	0.877	0.695	0.712	0.754	0.765	0.740
X1.2	0.862	0.699	0.711	0.751	0.759	0.735
X1.3	0.784	0.623	0.638	0.683	0.657	0.664
X1.4	0.741	0.682	0.697	0.711	0.717	0.705
X2.1	0.669	0.748	0.678	0.657	0.694	0.642
X2.2	0.696	0.757	0.706	0.685	0.707	0.668
X2.3	0.638	0.667	0.654	0.636	0.649	0.622
X2.4	0.673	0.686	0.660	0.641	0.650	0.628
X3.1	0.696	0.707	0.758	0.685	0.706	0.668
X3.2	0.713	0.709	0.764	0.702	0.716	0.684
X3.3	0.655	0.628	0.682	0.654	0.658	0.638
X3.4	0.688	0.685	0.698	0.667	0.679	0.653
X4.1	0.726	0.692	0.703	0.858	0.723	0.725
X4.2	0.744	0.716	0.725	0.855	0.744	0.742
X4.3	0.653	0.602	0.617	0.769	0.625	0.664
X4.4	0.619	0.660	0.673	0.725	0.694	0.679
X5.1	0.707	0.700	0.714	0.695	0.747	0.677
X5.2	0.735	0.732	0.745	0.723	0.766	0.704
X5.3	0.666	0.632	0.649	0.664	0.670	0.647
X5.4	0.616	0.671	0.675	0.684	0.699	0.669
Y1	0.701	0.670	0.681	0.721	0.699	0.753
Y2	0.731	0.707	0.714	0.751	0.732	0.769
Y3	0.632	0.576	0.589	0.661	0.606	0.682
Y4	0.703	0.651	0.662	0.683	0.682	0.705

- *Description:*

Values in bold are the values used as a reference in the analysis of each variable.

The study shows that each indicator in variable X1, which is the construction factor, has a stronger connection with the indicators X1.1, X1.2, X1.3, and X1.4 compared to its connection with other variables like X2, X3, X4, X5, and Y.It also shows that each indicator in the other variables has a similar strong connection within their own group. Therefore, it can be said that the fulfillment of this criterion guarantees strong discriminant validity and has met the requirements specified for a test variable in the study.

✓ *Fornel-Lacker Discriminant Validation Test*

Table 6 Fornel-Lacker Value

	X1	**X2**	**X3**	**X4**	**X5**	**Y**
Construction Factor (X1)	0.780					
Contract Administration Factor (X2)	0.712	0.760				
Technical Specification Factor (X3)	0.731	0.745	0.768			
Resource Factor (X4)	0.750	0.698	0.664	0.779		
Policy Factor (X5)	0.684	0.721	0.736	0.738	0.764	
Execution Time Performance (Y)	0.698	0.731	0.746	0.765	0.752	0.772

- *Description:*

Values in bold are the values used as a reference in the analysis of each variable.

The findings of the research demonstrate that the value of variable X1 (construction factor) in column X1 (construction factor) surpasses that of the other variables (X2, X3, X4, X5, and Y). Hence, it can be concluded that the metrics applied in the analysis have fulfilled the criteria established for a test variable in the research.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26jun1305

✓ *Discriminant Validation Test of Heterotrait-Monotrait Ratio (HTMT) Values – Matrix*

Table 7 Heterotrait-Monotrait Ratio (HTMT) Value – Matrix

	X1	X2	X3	X4	X5	Y
Construction Factor (X1)						
Contract Administration Factor (X2)	0.872					
Technical Specification Factor (X3)	0.689	0.691				
Resource Factor (X4)	0.764	0.701	0.793			
Policy Factor (X5)	0.671	0.612	0.645	0.825		
Execution Time Performance (Y)	0.735	0.862	0.609	0.678	0.712	

The results showed that the value for each test variable was below 0.9, with the highest value being 0.872, confirming that all variables were strongly discriminant. By meeting these three criteria, the measurement model was declared discriminantly valid and suitable for use in hypothesis testing at the structural model analysis stage.

✓ *Reliability Test*

Table 8 Composite Reliability Value and Cronbach's Alpha Value

	Cronbach's alpha	***Composite reliability (rho_a)***	***Composite reliability (rho_c)***	***Average variance extracted (AVE)***
Construction Factor (X1)	0.768	0.774	0.781	0.734
Contract Administration Factor (X2)	0.678	0.705	0.702	0.658
Technical Specification Factor (X3)	0.715	0.723	0.735	0.693
Resource Factor (X4)	0.753	0.761	0.772	0.725
Policy Factor (X5)	0.689	0.719	0.708	0.661
Execution Time Performance (Y)	0.742	0.751	0.764	0.710

The research results show that the Composite Reliability (rho_c) for each test variable is above 0.7, and the Cronbach's Alpha score is more than 0.6. So, based on this, we can say that all the variables in this study work well together and are dependable, which means the data can be trusted for further analysis of the structure and how the variables relate to each other.

➢ *Structural Model Test (Inner Model / Structural Model)*

Once the measurement model, which is also called the outer model, is checked and found to meet the standards for validity and reliability, the next step is to evaluate the structural model, which is referred to as the inner model. This assessment is meant to check how closely the hidden variables in the model are linked and to see how well the factors that are not influenced by other variables can explain the outcome variable. In this research, two tests were employed to examine the structural model: the R^2 (coefficient of determination) and the path analysis test (Path Coefficient).

- *R^2 Determination Coefficient Test (R-squared)*

The R^2 (R-squared) coefficient of determination test is conducted to evaluate the relationship between variables to determine whether they meet the test criteria. The criteria for a variable to pass the R^2 (R-squared) test are as follows:

Table 9 R^2 Test Conditions

Test Type / Criteria	Indicators / Parameters	Valid / Reliable Criteria	Results
R^2 (R-squared)	R^2 value ≤ 0.25 (25%)	Weak Relationship	√
	R^2 value 0.25-0.74 (26% - 74%)	Moderate Relationship	√
	R^2 value ≥ 0.75 (75%)	Strong Relationship	√

The results of the R^2 Determination Coefficient Test (R-squared) in this study are:

Table 10 R^2 (R-Squared) Test Results

	R-Square	**Category**
Y	0.783	Strong

R^2 for the implementation time performance variable (Y) = 0.783 → 78.3%.

R^2 for the influenced variable, namely the implementation time performance variable (Y) is 78.3% with the understanding of the ability of the independent variables, namely the variables causing the occurrence of contract change orders (CCO) construction factors (X1), contract administration factors (X2), technical specification factors (X3), resource factors (X4), and policy factors (X5) are able to influence the implementation time performance. So each variable in this study has a strong influence on the magnitude of the relationship, and the remaining 21.7% of other influences are explained by variables outside the variables discussed in this study.

- *Path Analysis Test (Path Coefficient)*

The Path Coefficient evaluation serves to assess how significant the effect of every variable is, fulfilling the

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necessary test standards and demonstrating a correlation that can be either positive or negative. For a variable to be considered successful in the Path Coefficient analysis, it needs to meet specific criteria.These include having a T-Statistic that is greater than 1.96 and a P-Value that is less than 0.05. Here are the results from calculating the path coefficients between the different variables.:

Table 11 Path Coefficient Between Variables

	Path Coefficient	***Sample Mean (M)***	***Standard Deviation (STDEV)***	***T Statistics***	***P values***
X1 -> Y	0.443	0.375	0.211	2,783	0.000
X2 -> Y	0.312	0.255	0.129	2,309	0.002
X3 -> Y	0.420	0.339	0.193	2,340	0.001
X4 -> Y	0.438	0.348	0.203	2,675	0.000
X5 -> Y	0.390	0.290	0.178	2,324	0.001

✓ *Description:*

Values in bold are the values used as a reference in the analysis of each variable.

Based on the research results, all independent variables X1 (construction factor), X2 (contract administration factor), X3 (technical specification factor), X4 (resource factor), and X5 (policy factor) The T-Statistics are higher than 1.96 and the P-Values are lower than 0.05, which meets the criteria needed to pass the Path Analysis test, also known as the Path Coefficient test Specifically, namely:

- X1 → Y T-Statistic 2.783 with P-Values 0.000
- X2 → Y T-Statistic 2.309 with P-Values 0.002
- X3 → Y T-Statistic 2.340 with P-Values 0.001
- X4 → Y T-Statistic 2.675 with P-Values 0.000
- X5 → Y T-Statistic 2.324 with P-Values 0.001.

This shows that all independent variables X1 (construction factor), X2 (contract administration factor), X3 (technical specification factor), X4 (resource factor), and X5 (policy factor) significantly influence the dependent variable Y (execution time performance), which means that each cause of the contract change order (CCO) significantly influences the execution time performance.

Table 12 Path Coefficient Estimation

Path (Independent → Dependent)	**Path Coefficient**	***Information***
Construction factors → execution time performance	0.443	Positive Influence
Contract administration factors → implementation time performance	0.312	Positive Influence
Technical specification factors → execution time performance	0.420	Positive Influence
Resource factors → execution time performance	0.438	Positive Influence
Policy factors → implementation time performance	0.390	Positive Influence

Path coefficient analysis shows that all dependent variables have path coefficient values between 0.312 and 0.443 (above zero). This confirms that all independent variables (X) and dependent variables (Y) have a positive, unidirectional relationship.

➢ *Strategy to Prevent Contract Change Orders (CCO) in Road Construction Project Implementation in Poso Regency*

- *Construction Factors*

Prevention of contract change orders (CCO) from a construction perspective can be done by ensuring that surveys and field inspections are carried out thoroughly before designing.

- *Contract Administration Factors*

Consistency between documents is crucial to prevent discrepancies that could lead to future changes to the work. Internal and external review by technical and legal experts is required to ensure the documents are error-free. Furthermore, the scope of work must be described in detail, including horizontal and vertical boundaries, implementation methods, and specific site conditions.

- *Technical Specification Factors*

Strategies to prevent contract change orders (CCOs) in technical specifications can begin with developing specifications that comply with national standards, such as SNI (Indonesian National Standard) and Bina Marga guidelines, and adapt them to field conditions and local material availability. These specifications must be clearly and detailed, leaving no room for differing interpretations.

- *Resource Factors*

Contract change order (CCO) prevention is based on resource aspects through the provision of qualified personnel, including certified experts and experienced operators. The availability of primary and supporting equipment must be ensured from the outset, accompanied by maintenance and backup plans to avoid changes in methods due to equipment failure. Planning for material requirements must be carried out accurately, including ensuring that the quality and quantity of materials comply with existing regulations.

- *Policy Factors*

From a policy perspective, contract change orders (CCOs) can be prevented by ensuring stable budget policies and project planning from the outset, preventing changes in priorities that could lead to revised scopes of work. The

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project implementing agency must also have clear standard operating procedures (SOPs) for controlling contract changes, including authority limits, approval procedures, and supporting documentation requirements.

V. CONCLUSION

The main reasons why change orders happen in road construction projects in Poso Regency are the first construction factor, which has an original value of 0.443, the second resource factor with an original value of 0.438, the third technical specification factor with an original value of 0.420, the fourth policy factor with an original value of 0.390, and the fifth contract administration factor with an original value of 0.312. Changing contracts through order updates can have a good effect and greatly impact how long a project takes to complete. So, we can say that each reason for a change order in the contract has a big effect on how long it takes to complete the project. The way to stop contract change orders from happening during road construction projects in Poso Regency is to do a detailed survey and check the area before starting the design.This helps make sure the construction plan matches the real conditions on the ground, so there's no need for changes once the work begins. Then prepare comprehensive, clear, and unambiguous contract documents, including working drawings, cost budget plans, bill of quantities, as well as general and special conditions in the contract. Then prepare the specifications clearly, in detail, and without giving opportunities for different interpretations, the selection of qualified workers including certified experts and experienced operators and for the provision of materials should be prepared early to ensure the availability of goods, so that there will be no changes in design or specifications caused by lack of materials, which can cause the emergence of contract change orders (CCO), and ensure that budget policies and project planning are stable from the start, so that there are no changes in priorities that have an impact on the revision of the scope of work.

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