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STUDY ON THE IMPLEMENTATION OF FRAMEWORK AGREEMENT CONSTRUCTION BASED ON RISK

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ABSTRACT

The contract is an important aspect that is crucial in the implementation of construction projects. Framework agreement is one of the model contracts that are still limited implementation in the construction world in Indonesia. This study aims to assess the application of Framework agreement in the construction field, especially from the aspect of risk; it starts from identification to the risk allocation of the aspect of construction contracts. The research is done in the form of a survey by capturing the opinions or perceptions, experiences, and attitudes of respondents consisted of contracting, procurement, vendor, and the project owner. From the results of the study note that the most influential risk level is variable Fossil (X_8), Testing (X_9), Termination of employment (X_{16}), Delay Testing (X_{18}), Handover of some of the work ((X_{20}), Procedure variation (X_{28}), the Right Contractor to Halt Work (X_{33}), the risk of service users (X_{36}), the consequences of the risk of service users (X_{37}) and exemption from the obligation to force majeure (X_{44}).

Keywords: framework agreement, construction projects, level of risk.

INTRODUCTION

The system of procurement and contract execution is an important step in the construction cycle. Framework agreement is one of the models that are still limited in procurement application of construction contracts in Indonesia. Things are different in other countries such as Britain that its application has been performed widely in the field of construction, and there is a standard framework agreement, NEC3 in the field of construction. Meanwhile in Indonesia framework agreement system is still limited to the procurement of materials and services as the maintenance of are implemented by LKPP (Institute for Procurement Policy and Government Services in Indonesia).

The implementation of framework agreement on the construction work will be important to know against the risk they pose before the execution of the contract begins, so that these risks can be identified as early as possible so that the execution of the contract work to be done to run timely, appropriate, and charge

Uncertainty risk that will arise will cause no predictability risks to be acceptable impact, so that the necessary identification and analysis of a risk that the project risks will occur can be avoided and predicted as early as possible. The project implementers should strive to be minimized and uncertainties that are anticipated to provide some alternative actions to deal with the uncertainty, in other words, the risk must be managed in the best possible way so that the goals and objectives of the project are appropriate, timely and charge.

LITERATURE REVIEW

From previous studies conducted by Zhang Shuibo (2006), Aisha Nidar (2012), Ben Edwards (2011) and Kusayanagi (2011) about the risks inherent to the contract clauses such as FIDIC General Conditions of contruct obtained a number of variables relevant risks that can be used on a framework agreement as follows:

Table-1. Risk variable in construction contracts.

No.	Variable risk
1	Delay figure plan or instruction
2	The right to enter the field
3	Cooperation
4	Installation of signs limit
5	Field data
6	Physical condition that were not estimated previously
7	Electricity, water and gas
8	Fossil
9	Testing
10	Rejection
11	Repair work
12	Extension of time settlement
13	Delay due to action ruler

14	Level job advancement
15	Penalty due to delay
16	Termination of employment
17	Consequences of termination
18	Delay testing
19	Not passed tests at the end of work
20	Handover some work
21	Disruption of testing at the end of work
22	Quality defects notification period extension
23	Failure to improve the quality defects
24	Investigations by the contractor
25	Evaluation
26	Elimination
27	Value engineering
28	Variation procedure
29	Adjustment due amendment
30	Payment schedule
31	Late payment
32	Payments after termination
33	Right to stop work contractors
34	Payment of termination when using
35	Provision of torts
36	Risk user services
37	Consequences for risk user services
38	General requirements for insurance
39	Insurance for works and contractor's equipment
40	Human and accident insurance for damage possession
41	Force majeure
42	Consequences of force majeure
43	Options for termination, payment and liberation
44	Exemption of liability implementation

Source: Data Processing, 2015

METHODOLOGY

The research method is applied in the form of survey research. The research surveys are generally conducted to take a generalization of observations that are not deep. The survey research technique was done by capturing the opinions or perceptions, experiences, and attitudes of the respondents about the risk factors that could potentially arise and affect the project cycle and forms handling taken to anticipate those risks.

Data collection

The collection of data in this study is done by using questionnaires or questionnaire with Likert scale measurement. This questionnaire is a technique where data collection is done by giving a set of questions or a written statement to the respondent to answer it. This is an efficient data collection technique when researchers know for certain variables measured and know what to expect from the respondents.

The samples in this study are those who have or are involved in the execution of the contract paying a total of 140 respondents.

Risk analysis

After it emerged any risks that have occurred in the project, followed by risk analysis using probability and impact matrix. According to Williams (1993), "Probability Impact Matrix" is an approach that was developed using two important criteria for measuring risk, namely:

1. Probability, is the probability of an undesired event.
2. Impact, is the level of influence or impact size in other activities, if the undesirable event occurs.

The level of risk is the product of the probability score and the scores obtained from the respondents impact (Well-Stam, *et al*, 2004). The value risk is the product of the probability scores and scores of impact, risk scores obtained from the respondents (Hillson, 2002). To measure the risk we can use the formula:

$$R = P \times I \quad (1)$$

where

R = Level of risk, P = (Probability) risk takes place

I = Impact (Impact) and risk of loss

Probabilitas							
	ST	5	5	10	15	20	25
	T	4	4	8	12	16	20
	S	3	3	6	9	12	15
	R	2	2	4	6	8	10
	SR	1	1	2	3	4	5
			1	2	3	4	5
			SK	K	C	B	SB
			Severity				

Figure-1. Matrix of probability and impact.

Specification:

High risk Medium risk Low risk

To quantify the probability and impact of risk events items scale used is:

Probability
Very Low (SR) = 1, Low (R) = 2, Medium (S) = 3
High (T) = 4, Very High (ST) = 5

Impact / Severity
Very Small (SK) = 1, Small (K) = 2, Enough (C) = 3
Large (B) = 4, Very Large (SB) = 5

The process of probability and impact matrix is plotting by the value of risk that has been gained into the matrix. After it can be used as a reference value to determine any risks that the possibility of a large and significant impact.

Risk influence on performance project

Data analysis

Analysis were performed using SPSS 22.0 and Monte Carlo PCA. Data analysis includes the analysis of factors and path analysis is the level of risk and performance relationship.

Analysis of factors

Considering the number of risk variables obtained from the literature review, the 44 variables are put in four groups of risk, then the amount necessary for the subsequent analysis of factor analysis to obtain the dominant cause of the occurrence of the risk on an umbrella contract. Factor analysis was conducted in two parts. In Part 1 the procedure is the data and extract the assessment factor. From this stage the test results are obtained in the form of tables. Total Variance Explained or eigenvalues obtained in SPSS is compared with the value corresponding to the random outcome of a parallel analysis (Monte Carlo PCA). If the value of the SPSS output is greater than the value of the parallel analysis criterion, then the factor retained for further analysis. Conversely, if the lower eigenvalues, then these factors is in the exhaust. In part 2 additional procedures required to rotate with Varimax method and interpret the factor scores with regression method.

Path analysis

Path analysis is a technique the development of multiple linear regressions. This technique is used to examine the contribution of which is shown by the path coefficient on each path diagram of causal relationships between variables X_1 X_2 and X_3 to Y and their impact on Z (Retherford, 1993).

To determine the effect of risk on the performance of the project can structurally regression equation as :

$$Y_1 = 0{,}483\ X_1 - 0{,}284\ X_2 - 0{,}221\ X_3 + 0{,}241\ e_1 \quad (2)$$

$$Y_2 = 0{,}208\ X_1 + 0{,}297\ X_2 + 0{,}202\ e_1 \quad (3)$$

$$Y_3 = 0{,}171\ X_1 + 0{,}304\ X_2 + 0{,}155\ X_3 + 0{,}195\ e_1 \quad (4)$$

$$Y_4 = 0{,}858\ X_1 + 0{,}135 X_2 + 0{,}302\ e_1 \quad (5)$$

RESULTS AND DISCUSSIONS

The respondents were surveyed about 140 people both from implementing the framework agreement who have or are working on a framework agreement project construction project implementation in Indonesia scattered both government agencies and the private individual who has a reputation in the execution of construction framework agreement.

Evaluation of risk

Assessment of the level of risk is to provide an assessment of the risk = probability x impact that occurs as described as follows:

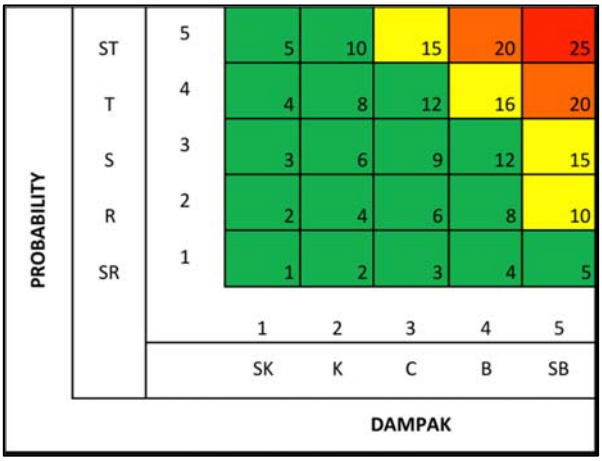

Figure-2. Setting level of risk.

Figure 2 shows that the level of risk. The risk mapping occurs is: at low level (green) 56.34%, the level was moderate (yellow) 34.08% and the level of high risk (red) 9.57%.

Risk influence on performance project

To determine the effect of risk on the performance of the project carried out analysis factor and path analysis as follows:

Factor analysis

The results of the factor analysis obtained from four groups of factors that qualify are illustrated in the table below.

Table-2. Results of factor analysis risk group.

Rotated component matrix[a]				
	Component			
	1	2	3	4
1	,991	,992	,988	,987
2	,987	,988	,987	,985
3	,987	,988	,986	,702
4	,985	,988	,982	,113
5	,983	,988	,982	,094
6	,983	,987	,980	
7	,981	,987	,931	
8	,980	,986	,910	
9	,980	,986	,072	
10	,980	,985		
11	,979	,980		
12	,978	,979		
13	,973	,971		
14	,970			
15	,967			
16	,962			
17	,704			
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.[a]				
a. Rotation converged in 4 iterations.				

Source: Results analysis of 2015

Based on the calculation, results of factor analysis obtained from 4 groups of risk factors will be used for further analysis, namely regression analysis and path analysis.

From some models of existing lines, in this test will use lines model with type recursif or unidirectional arrows. The following image is the result of path analysis with examples of four risk groups:

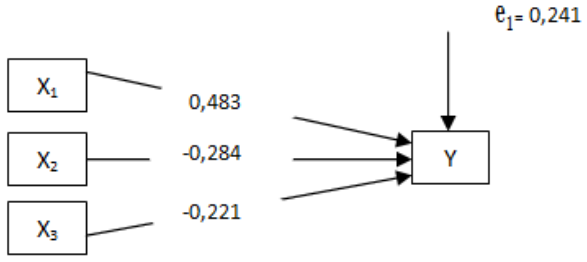

Figure-3. Model of risk factors recursif line 1.

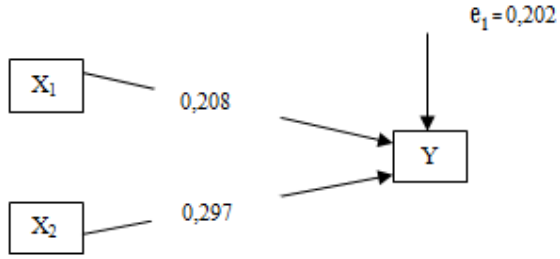

Figure-4. Model of risk factors recursif line 2.

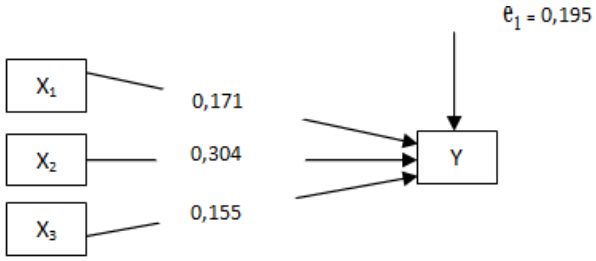

Figure-5. Model of risk factors recursif line 3.

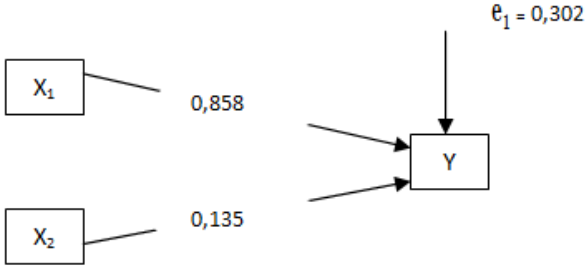

Figure-6. Model of risk factors recursif line 4.

After multiple regression analysis results obtained from path analysis for risk group 4 is shown in the following table:

Table-3. Results of path analysis of Group 1.

Sub structural (X1 X2 X3 ke Y)				
Model	**Koefisien Jalur**	**t**	**p**	**R^2**
X1 (ρ yX1)	0,483	2,335	,021	0,942
X2 (ρ yX2)	- 0,284	-2,105	,037	
X3 (ρ yX3)	- 0,221	-2,081	,040	

Source: Results of analysis of 2015

Table-4. Results of path analysis of Group 2.

Sub structural (X_1 X_2 ke Y)				
Model	**Koefisien Jalur**	**t**	**p**	**R^2**
X_1 (ρ yX_1)	0,208	1,778	,078	0,959
X_2 (ρ yX_2)	0,297	2,668	,009	

Source: Results of analysis of 2015

Table-5. Results of path analysis of Group 3.

Sub structural (X_1 X_2 X_3 ke Y)				
Model	**Koefisien Jalur**	**t**	**p**	**R^2**
X_1 (ρ yX_1)	0,171	3,310	,001	0,962
X_2 (ρ yX_2)	0,304	2,706	,008	
X_3 (ρ yX_3)	0,155	4,425	,000	

Source: Results of analysis of 2015

Table-6. Results of Path Analysis Group 4.

Sub structural (X_1 X_2 ke Y)				
Model	**Koefisien Jalur**	**t**	**p**	**R^2**
X_1 (ρ yX_1)	0,858	24,873	,000	0,909
X_2 (ρ yX_2)	0,135	3,921	,000	

Source: Results of the analysis in 2015

Overall, the effects of sub-structural formed can be described through structural equation is

$Y = \rho\, yX_1 + \rho\, yX_2 + \rho\, yX_3 + Є_2$, or

$$Y_1 = 0{,}483\ X_1 - 0{,}284\ X_2 - 0{,}221\ X_3 + 0{,}241\ e_1 \quad (2)$$

By way of similar analysis for the group factor of 2, 3 and 4 of the obtained structural equation each group as follows:

$$Y_2 = 0{,}208\ X_1 + 0{,}297\ X_2 + 0{,}202\ e_1 \quad (3)$$

$$Y_3 = 0{,}171\ X_1 + 0{,}304\ X_2 + 0{,}155\ X_3 + 0{,}195\ e_1 \quad (4)$$

$$Y_4 = 0{,}858\ X_1 + 0{,}135X_2 + 0{,}302\ e_1 \quad (5)$$

From four structural equations it can be seen that there are 10 variables that influence the risk of contractual risk that there is a variable X_{20}, X_{28}, X_{33}, X_8, X_9, X_{36}, X_{37}, X_{44}, X_{16}, X_{18}. From analysis above path, found the highest Beta value indicates that the risk variables affect the performance of the project on an umbrella contract is as described in the table below:

Table-7. The beta based on regression results.

No. factor	Beta	Variabel
1	0,483	20
2	0,297	9
3	0,304	37
4	0,858	16

Source: Analysis of 2015 Results

If in the review of aspects of the allocation of risk to the parties in contractor and employer (owner) according to the respondents, the obtained distribution of risk as shown in Table 8 below:

Table-8. Allocation of Risk Based Risk Group Influential.

Group	1	2	3	4
Contractor	20, 33	8	37	9,18
Employer	28	-	36, 44	16

Source: Results of analysis of 2015

Table-8 above shows that the greatest risk allocation occurs framework agreement risk load balance between service users and service providers.

CONCLUSIONS

a) Mapping the level of risk that occurs is: at low level (green) 56.34%, the level was moderate (yellow) 34.08% and the level of high risk (red) 9.57%.

b) From the results of the regression analysis found only 10 of the 44 risk variables that affect the performance of the Framework agreement project 10 risk variables that affect the contractual risk that there is a variable among others: Fossil (X_8), testing (X_9), Termination of employment (X_{16}) , Delay Testing (X_{18}) Handing over some of the work (X_{20}), Procedure variation (X_{28}), Right to Stop Work Contractors (X_{33}), the risk of service users (X_{36}), the consequences of the risk of service users (X_{37}) and exemption from the obligation to force majeure (X_{44}).

c) Based on path analysis four structural equations are obtained for each risk group.

d) Risk of framework agreement is allocated by the purview of contractor 40% and employer 60%.

RECOMMENDATIONS

a) This study should be done to the respondent hypothesis that have more and more control or have experience in the construction process.

b) Further research needs a further in-depth study, including source and respond risk.

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