

Determination of Risk Types of Price, Lumpsum and Target Price Contract (THB) Using Analytic Hierarchi Process (AHP) Method

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Abstract:- In a project that uses a lump sum as a reference in submitting a bid is a design drawing so that high accuracy is needed in reading the image and calculating the Bill of Quantity (BOQ) and the Budget Plan (RAB). With the THB contract, the owner and contractor agree with their best efforts to review the design including the selection of materials and equipment in order to achieve the optimal contract value. In this case, the risk that is experienced is that it takes a long time to calculate progress so that it can disrupt cash flow which results in delays in implementation. The purpose of this study is to identify and determine the factors that affect the project risk from the unit price contract type, lump sum and wholesale price target (THB). Determine the type of contract that has the least risk in choosing the type of contract. From the factor weights that have been calculated using the Analytic Hierarchy Process (AHP) method, it is explained that the lump sum contract type is indeed relatively more risky to the ratio of profit to risk in project implementation. Whereas the type of contract with the least risk is the wholesale price target with the score of each type of contract, the unit price is in the second rank with a score of 0.423, lump sum is in the third rank with a score of 0.418, and THB is in the first position with a score of 0.469. So that the implementation is more efficient using the Contract Price Target (THB) type. From the factor weights that have been calculated using the Analytic Hierarchy Process (AHP) method, it is explained that the lump sum contract type is indeed relatively more risky to the ratio of profit to risk in project implementation. While the type of contract with the least risk is the wholesale price target with a score for each type of contract, the unit price is in the second rank with a score of 0.423, lump sum is in the third rank with a score of 0.418, and THB is in the first position with a score of 0.469. So that the implementation is more efficient using the Contract Price Target (THB) type. From the factor weights that have been calculated using the Analytic Hierarchy Process (AHP) method, it is explained that the lump sum contract type is indeed relatively more risky to the ratio of profit to risk in project implementation. While the type of contract with the least risk is the wholesale price target with a score for each type of contract, the unit price is in the second rank with a score of 0.423, lump sum is in the third rank with a score of 0.418, and THB is in the first position with a score of 0.469. So that the implementation is more efficient using the Contract

Price Target (THB) type. While the type of contract with the least risk is the wholesale price target with a score for each type of contract, the unit price is in the second rank with a score of 0.423, lump sum is in the third rank with a score of 0.418, and THB is in the first position with a score of 0.469. So that the implementation is more efficient using the Contract Price Target (THB) type. While the type of contract with the least risk is the wholesale price target with a score for each type of contract, the unit price is in the second rank with a score of 0.423, lump sum is in the third rank with a score of 0.418, and THB is in the first position with a score of 0.469. So that the implementation is more efficient using the Contract Price Target (THB) type.

Keywords:- Lump Sum, Unit Price, THB, Risk, AHP.

I. INTRODUCTION

The construction sector plays an important role in the country's economy because it affects most sectors of the country's economy and is an important contributor to the infrastructure development process that provides a physical foundation on which development efforts and improving living standards can be realized. Therefore, as the construction sector prepares for further development, the need for canals that can accommodate various business opportunities has increased. In 2015, the Indonesian government is targeting an economic growth rate of 5.8% with the infrastructure sector as the main driving factor.

Construction activities can be said to be successful if they are able to meet their objectives, namely completed on time, in accordance with the allocated costs and meet the quality requirements indicated. Various attempts were made to reduce or even avoid risks so that effective results can be achieved.

PT Total Bangun Persada Tbk (TOTAL) is a leading construction company that has a vision of pride and excellence in the construction sector. The types of contracts that are often used in TOTAL are the unit price, lump sum, and wholesale price target (THB). Kontrak Lumpsum namely the contract for the procurement of goods / services for the completion of all work within a certain time limit, with a fixed and fixed contract price, and all risks that may occur in the implementation of the work are fully borne by the goods / service provider or implementing contractor (Isnanto, 2009). Unit Price Contract is a contract for the procurement

of goods / services for the completion of all work within a certain time limit based on a fixed & fixed unit price for each work unit with certain technical specifications, whose work volume is still a provisional estimate (Isnanto, 2009). And for this type of contract the target wholesale price is often called a Cost & Fee contract. is a contract for the implementation of the procurement of goods / services, where the contractor in question receives a service fee whose value remains agreed by both parties. For this reason, it is necessary to further know the factors that distinguish these three types of contracts and the level of risk of these differentiating factors (Isnanto, 2009).

In a lump sum contract, the benchmark is the total bid value, not the breakdown of work items. This provides an understanding that the risk of price increases is the responsibility of the contractor. So it is perceived that the price fluctuation during the contract period is a risk to the service provider. But it is often forgotten that price fluctuations mean that there can be a decrease in price, so it is not only a risk but also an opportunity. It is not uncommon for the contractor to benefit from the bid price that is too high from the actual price during implementation. If the fluctuation (decrease) is large enough, the greater the contractor's profit and the greater the extra cost paid by the owner.

In a project that uses a lump sum, the reference for submitting bids is a design drawing so that high accuracy is needed in reading the image and calculating the Bill of Quantity (BOQ) and the Budget Plan (RAB). One of the problems that commonly occur in projects with lump sum contracts is the inaccurate volume calculation due to inaccurate reading of the drawings. This can be due to the relatively short supply time. Besides that, another risk is an error in predicting the price of the material to be used. In a lump sum contract, the agreed price will not change even if there are changes in volume or changes in material prices. In this case, the contractor will bear the risk.

The purpose of this study is to identify and determine the factors that affect the project risk from the unit price

contract type, lump sum and wholesale price target (THB). Determine the type of contract that has the least risk in choosing the type of contract.

II. THEORITICAL REVIEW

According to Isnanto (2009), Kontrak Lumpsumnamely the contract for the procurement of goods / services for the completion of all work within a certain time limit, with a fixed and fixed contract price, and all risks that may occur in the execution of the work are fully borne by the goods / services provider or implementing contractor. Unit Price Contract is a contract for the procurement of goods / services for the completion of all work within a certain time limit based on a fixed & fixed unit price for each work unit with certain technical specifications, whose work volume is still a provisional estimate (Isnanto, 2009). And for this type of contract the target wholesale price is often called a Cost & Fee contract. According to Isnanto (2009),kocost & fee transaction is a contract for the implementation of the procurement of goods / services, where the contractor concerned receives a service fee whose value remains agreed by both parties.

Risk management according to Noshworthy (2000), is the identification of threats and the implementation of measures aimed at reducing the occurrence of these threats and minimizing any damage ". "Risk analysis and risk control form the basis of risk management where risk control is a suitable application of management to strike a balance between security, use and costs.

The analytical hierarchical process or abbreviated as AHP (Saaty, 2008) is a decision-making approach designed to help find solutions to complex multicriteria problems in a number of application domains. The final result of AHP is a ranking or priority weighting of each alternative decision or called an element. Basically, there are three steps in decision making with AHP, namely: building a hierarchy, scoring; and priority synthesis.

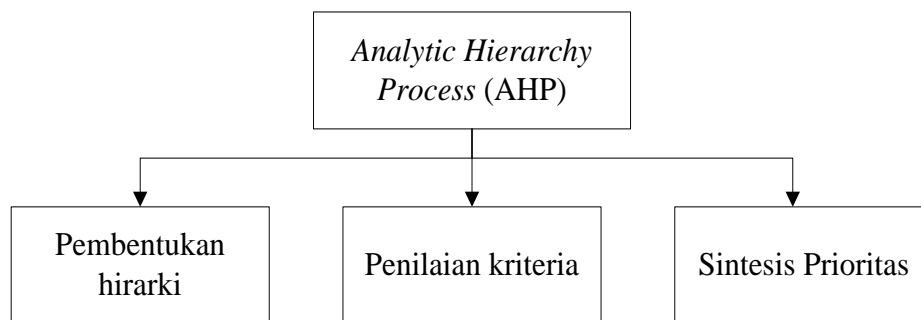


Figure 1. AHP Model

The advantages of AHP compared to other methods (Setyaningsih, 2008):

1. A hierarchical structure, as a consequence of the selected criteria, reaches the deepest sub-criteria.

2. Taking into account the validity to the extent of tolerance for inconsistencies of various criteria and alternatives chosen by decision makers.
3. Take into account the durability or resistance of the output sensitivity analysis of decision making.

III. METHOD

The method used in this research is descriptive quantitative method. Because in this study using a questionnaire then the results of the questionnaire are translated into numbers so that data processing can be done.

The sample is a part of the population studied. The sample in this study were 6 projects. Sample determination is carried out according to the ongoing project. There are 2 projects with a unit price contract system, 2 lump sums and 2 THB.

AHP is used to obtain a significant level / effect of the unit price contract risk, lump sum, wholesale price target (THB). The results of calculations using the AHP method are a ranking or priority weighting of each alternative decision or element. The hierarchical arrangement of the criteria and sub criteria can be seen in Figure 1. There are 3 criteria and 2 sub criteria or in this hierarchy there are 3 levels to be measured, namely:

- Criteria:
 - a. Quality
 - b. Time
 - c. Cost
- Sub criteria:
 - a. Quality
 1. Low construction productivity
 2. Security risk
 3. Field access
 4. Claim
 5. Late completion of work
 - b. Time:
 1. Reschedule changes
 2. Approval and permission
 - c. Cost
 1. Bid price
 2. The amount of material does not match
 3. *Redesign*
 4. Differences in field conditions

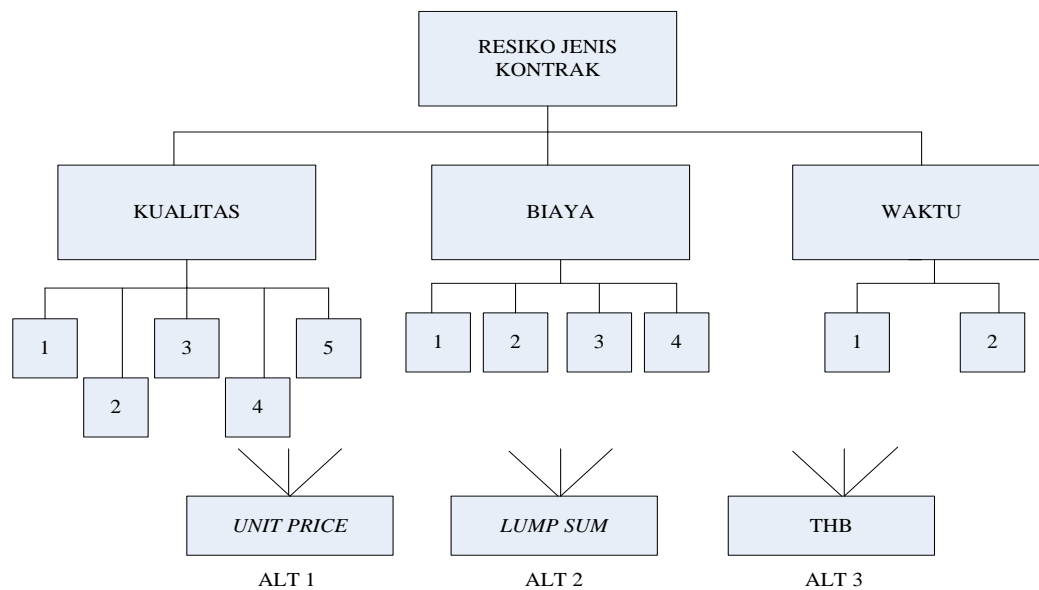


Figure 2. AHP hierarchy

IV. RESULTS AND DISCUSSION

Table 1 is the overall factor weight based on the type of contract on quality, cost and time. Based on the results of calculations using the AHP method, the criteria for which the 3 types of contracts are prioritized are quality. Then time, because with time it can affect the quality and cost overruns. And the last priority of the three types of contracts is cost.

Table 1. Weight of Sub Criteria Factors			
Sub Criteria	Factor Weights		
	Unit Price	Lumpsum	THB
Quality	0.55	0.53	0.66
Cost	0.18	0.16	0.12
Time	0.27	0.31	0.21

Table 2. Combined Weight of Sub Quality Criteria						
Criteria	Productivity	Security	Access	Claim	Late	Eigen factor mean
Productivity	0.12	0.17	0.10	0.08	0.13	0.12
Security	0.27	0.39	0.32	0.51	0.32	0.36
Access	0.25	0.26	0.21	0.14	0.25	0.22
Claim	0.28	0.15	0.29	0.19	0.21	0.23
Late	0.07	0.03	0.07	0.07	0.08	0.07

Table 2. Is the combined weight of 6 respondents for the quality sub-criteria. From the results of these calculations it can be seen that the highest weight that determines quality is the security risk, where this risk can affect the delay in completion as well which can cause dissatisfaction with customers.

Table 3. Combined Weight of Sub Cost Criteria					
Criteria	Condition	Offer	Material	Redesign	Eigen factor mean
Condition	0.14	0.20	0.13	0.11	0.14
Offer	0.21	0.30	0.23	0.26	0.25
Material	0.35	0.43	0.33	0.32	0.36
Design	0.31	0.07	0.32	0.31	0.25

Table 3. Is the combined weight of 6 respondents for the sub-cost criteria. From the results of these calculations it can be seen that the highest weight that determines the cost is material, because material prices are difficult to predict. Because usually the time span from the time of the tender to the implementation is long, it is possible that material prices may change.

Table 4. Combined Weight Between Sub Cost Criteria			
Time	Schedule	Licensing	Eigen factor mean
Schedule	0.61	0.61	0.61
Licensing	0.39	0.39	0.39

Table 4. Is the combined weight of 6 respondents for sub criteria time. From the results of these calculations, it can be seen that the priority is the schedule, because these sub-criteria greatly affect quality and cost.

Table 5. Scoring of Contract Types				
Criteria	Weight	Factor Weights		
		Unit Price	Lumpsum	THB
Quality	0.60	0.55	0.53	0.66
Cost	0.16	0.18	0.16	0.12
Time	0.24	0.27	0.31	0.21
SCORE		0.423	0.418	0.469

After calculating the criteria and each sub-criterion, the next step is to calculate the scoring to determine the type of contract that has the least risk level. From the score, it can

be determined that the THB contract type has the first position for the smallest level of risk.

V. CONCLUSION

Based on the research results, it can be concluded:

1. The factors that affect the project risk of these three types of contracts are 3 factors that can affect the success of a project, namely good quality, timely completion and costs that do not exceed the predetermined budget. The factors that affect the quality itself are project safety, claims against the owner, access to the project also greatly determines whether the quality is good or not, productivity and delays in implementation. Factors affecting this cost criterion are material calculations that must be calculated carefully so that costs do not overrule. Bid conditions and redesign also greatly affect the cost risk and project conditions.
2. From the calculation results, it is clear that the lump sum contract type is relatively riskier to the ratio of profit to risk in project implementation. Whereas the type of contract with the least risk is the wholesale price target with the score of each type of contract, the unit price is in the second rank with a score of 0.423, lump sum is in the third rank with a score of 0.418, and THB is in the first position with a score of 0.469. So that the implementation is more efficient using the Contract Price Target (THB) type.

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