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Selection of the Contractor for the Construction of the Cinere Jagorawi (Cijago) Section Ii Toll Road, West Java Indonesia

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ABSTRACTS: Choosing a contractor for construction project work is not an easy job, because it requires accuracy in its determination, including in the work of the Cijago Toll Road Section II. Therefore, a method is needed, one of which is the Analytical Hierarchy Process (AHP) method to support decisions taken by the Ministry of PUPR as the Owner. Based on the respondents' assessment using the ahp method in tables 3 and 4 above, it can be seen that the selected contractor is PT.LMA. Because it has the highest value of 0.697 compared to PT.PP (0.245) and PT.HK (0.058). This assessment is based on 10 predetermined criteria.

KEYWORDS: Selection, Contractor, AHP (Analytical Hierarchy Process)

INTRODUCTION

According to Government Regulation Number 23 of 2024 concerning Toll Roads, states that toll roads are public roads that are part of the road network system and as national roads whose users are required to pay tolls. The implementation of toll roads aims to increase the efficiency of distribution services in supporting increased economic growth, especially in areas that already have a high level of development. Based on data from the Central Bureau of Statistics in 2024, the growth rate of Banten, DKI Jakarta and West Java provinces for the 2010-2035 period was 2.3%, 1.11% and 1.58% respectively. The Jakarta, Bogor, Depok, Tangerang (Jabodetabek) area as part of these provinces cannot be separated from population growth so that the need to move continues to increase and will reduce road performance. The construction of Jakarta Outer Ring Road (JORR) I and Jakarta Outer Ring Road (JORR) II is one of the solutions to overcome the decline in road performance, which is expected to reduce congestion in the Jabodetabek area and improve the economic and social sectors in the region.

The Cinere-Jagorawi (Cijago) Toll Road is part of the Jakarta Outer Ring Road (JORR) II project. The construction of Cinere-Jagorawi Toll Road is divided into 3 (three) sections, namely Section I from Jagorawi to Jalan Raya Bogor along 3.70 km, Section II from Jalan Raya Bogor to Kukusan along 5.50 km, and Section III from Kukusan to Cinere along 5.44 km. Currently, the ongoing Cinere-Jagorawi Toll Road project is in Section III.

To build the Cigajo toll road, contractor services are needed that can complete the construction work in accordance with the agreed contract. Gaffar (2004) states that the most dominant contractor selection criteria identified by the project owner based on ranking are the availability of funding, the contractor's expertise in working with the project owner, consultants, government and the community, and the contractor's detailed offer is a competitive price. However, the Indonesian government through the Ministry of Public Works and Housing Development (MPWH) is struggling to select the right contractor. This is due to 2 main factors, namely: 1) There are several contractors with various criteria. 2) The quality of contractors varies. So a system is needed to accommodate the selection of contractors to build this Cijago toll road.

One method that can be used is by using the Analitycal Hierarchy Process (AHP). This method is useful for evaluating and making multi-criteria decisions. AHP is reliable because in AHP a priority is compiled from various choices that can be in the form of criteria that have previously been decomposed (structure) in advance, so that priority setting is based on a structured process (hierarchy) and makes sense. According to Saaty (2001), the AHP method helps solve complex problems by structuring a hierarchy of criteria, interested parties, results and by drawing on various considerations to develop weights or priorities.

AHP is a geographic information system (GIS)-based decision-making analysis that is popular for its ability to integrate heterogeneous data sets. AHP also makes it easy to get very large alternative weights and can be applied to decision making in various problems. (Budianta, 2020). Furthermore, it is also mentioned that AHP is a method that considers many objective and subjective factors in ranking alternatives. In addition, AHP can help the decision-making process through a hierarchical decision model. The AHP method uses a pairwise comparison matrix that forms a reciprocal matrix in converting qualitative ratio data. Eigenvalue is used to access the final weight of the criteria and measure the level of consistency obtained through the consistency index (Vahidnia et al., 2009; Saaty, 2008; Chen

et al., 2009; Eldrandaly, 2013). Therefore, this research uses AHP to make decisions in selecting contractors for the Cijago section II toll road project.

RESEARCH METHOD

This research uses AHP (Analytical Hierarchy Process) with a questionnaire method given to 32 respondents who are directly responsible for the construction of the Cijago section II toll road. The 32 respondents include 1) 21 owners from the Directorate General of Barrier Free, 2) 7 people from the Selection Working Group of the Directorate General of Bina Konstruksi, and 3) 4 consultants.

AHP analysis begins by defining the criteria that will be used as a reference for selecting prospective contractors who will work on the Cijago section II toll road project.

In weighting criteria, the law of Reciprocal Axiom applies, namely if a parameter is considered more important five times than another parameter, then the more important parameter becomes 1/5 times. If the weighting process has been completed, the next step is the preparation of a pairwise comparison matrix to normalize the weight of the level of importance of each parameter in each hierarchy. After the pairwise comparison matrix is compiled, then a consistency test is carried out on the weighting and benchmarks with the Consistency Index (CI) which is a comparison of the Ratio Index (RI) or Consistency Ratio (CR).

RESULT AND DISCUSSION

Based on the initial validation, there are 10 criteria that will be used as a reference to select 3 main contractors proposed by the government (1. PT. LMA, 2. PT. PP, 3. PT. HK). The 10 criteria are:

1. Occupational health and safety (OHS)
2. Work experience (WE)
3. Contractor quality (CQ)
4. Contractor performance (CP)
5. Work order (WO)
6. Contractor achievements (CA)
7. Legal status of the contractor (LS)
8. Knowledge of the contractor (KC)
9. Technical aspects (TA)
10. Financial capability (FC)

To get a comparison value, all respondents provide an assessment. The comparison matrix and weights for each criterion are presented in Tables 1 and 2 below:

Table 1. Pairwise Comparison Matrix

CRITERIA	OHS	WE	CQ	CP	WO	CA	LS	KC	TA	FC
OHS	1	3	3	4	3	3	2	3	3	3
WE	0,3	1	2	3	2	3	2	3	3	3
CQ	0,3	0,5	1	4	3	2	4	3	2	3
CP	0,3	0,3	0,3	1	2	2	3	4	2	2
WO	0,3	0,5	0,3	0,5	1	3	2	3	3	3
CA	0,3	0,3	0,5	0,5	0,3	1	2	3	2	4
LS	0,5	0,5	0,3	0,3	0,5	0,5	1	3	4	3
KC	0,3	0,3	0,3	0,3	0,3	0,3	0,3	1	3	3
TA	0,3	0,3	0,5	0,5	0,3	0,5	0,3	0,3	1	3
FC	0,3	0,3	0,3	0,5	0,3	0,3	0,3	0,3	0,3	1
Sum	4,1	7,2	8,5	14,6	12,8	15,6	16,9	23,7	23,3	28

Table 2. Weight Values – *wi* for particular criteria

CRITERIA	OHS	WE	CQ	CP	WO	CA	LS	KC	TA	FC	*Weight Values (wi)*	*Ratio Value*
OHS	0,2	0,4	0,4	0,4	0,3	0,2	0,2	0,2	0,1	0,1	0,22	11,7
WE	0,07	0,1	0,29	0,3	0,2	0,24	0,16	0,16	0,14	0,1	0,15	12
CQ	0,07	0,07	0,15	0,4	0,29	0,16	0,31	0,16	0,09	0,1	0,15	12,3
CP	0,05	0,07	0,04	0,1	0,2	0,16	0,23	0,009	0,09	0,07	0,10	9,6
WO	0,07	0,07	0,05	0,05	0,1	0,24	0,16	0,16	0,14	0,098	0,10	11,6
CA	0,07	0,05	0,07	0,05	0,03	0,08	0,156	0,159	0,092	0,131	0,08	11,4
LS	0,11	0,05	0,04	0,03	0,05	0,04	0,08	0,159	0,183	0,098	0,08	10,7
KC	0,07	0,05	0,05	0,02	0,03	0,03	0,03	0,05	0,137	0,098	0,05	10,8
TA	0,07	0,05	0,07	0,05	0,03	0,04	0,02	0,02	0,05	0,098	0,05	10,9
FC	0,07	0,05	0,05	0,05	0,03	0,02	0,03	0,02	0,015	0,03	0,03	11,2
											Total	112,1

Lamda max (λmax) =112,1/10 = 11,21
Consistency index (CI) = (λmax-n)/(n-1)
= (11,21-10)/(10-1) = 0,13.

The number of criteria consisting of 10 types, the relativity index is 1.49, so the Consistency Ratio is 0.13/1.49=0.091<0,1. This means that all criteria are consistent and can be continued to select the right contractor to build the Cijago section II toll road.

The next step is to create a pairwise matrix for each contractor based on 10 criteria. This can be seen in tables 3 and 4 below.

Table 3. The Average of Eigenvalue for Each Contractor Based on Criteria

CRITERIA/ ALTERNATIVES	OHS	WE	CQ	CP	WO	CA	LS	KC	TA	FC
PT.LMA	0,711	0,702	0,729	0,675	0,675	0,717	0,687	0,687	0,637	0,637
PT.PP	0,237	0,242	0,216	0,259	0,259	0,227	0,257	0,257	0,290	0,290
PT.HK	0,052	0,056	0,055	0,065	0,065	0,055	0,056	0,056	0,072	0,072

Table 4. Contractor Ranking

CRITERIA/ ALTERNATIVES	OHS	WE	CQ	CP	WO	CA	LS	KC	TA	FC	Sum	Rank
PT.LMA	0,157	0,105	0,106	0,067	0,066	0,056	0,054	0,036	0,029	0,021	0,697	1
PT.PP	0,052	0,036	0,032	0,026	0,025	0,018	0,02	0,014	0,013	0,01	0,245	2
PT.HK	0,011	0,008	0,008	0,006	0,066	0,004	0,004	0,003	0,003	0,002	0,058	3

Based on the respondents' assessment using the ahp method in tables 3 and 4 above, it can be seen that the selected contractor is PT.LMA. Because it has the highest value of 0.697 compared to PT.PP (0.245) and PT.HK (0.058). This assessment is based on 10 predetermined criteria.

From the AHP analysis, according to the input provided from 32 respondents who were asked for their opinions based on the criteria, each criterion has a weight of:

1. Occupational health and safety (OHS) 22%, 2. Work experience (WE) 14,9%,
3. Contractor quality (CQ) 14,6%
4. Contractor performance (CP) 9,9%
5. Work order (WO) 9,8%
6. Contractor achievements (CA) 7,8%
7. Legal status of the contractor (LS) 7,8%
8. Knowledge of the contractor (KC) 5,3%
9. Technical aspects (TA) 4,6%
10. Financial capability (FC) 3,3%

Meanwhile, based on the respondents' assessment using the ahp method in tables 3 and 4 above, it can be seen that the selected contractor is PT.LMA. Because it has the highest value of 0.697 compared to PT.PP (0.245) and PT.HK (0.058). This assessment is based on 10 predetermined criteria.

The quality of a decision taken from a strong correlation with a change in the direction and process of something that is being done, it can even affect the quality or quantity of a goal.

AHP is a method that can solve complex problems, where the aspects taken are quite a lot. This complexity is also caused by the unclear structure of the problem, the uncertainty of the decision maker's perception and the uncertainty of the availability of inaccurate or even non-existent statistical data. (Cahyana, 2010)

The AHP method is considered capable of breaking something unstructured into its component parts, giving numerical values to subjective considerations about the relative importance of each variable, arranging parts or variables in a hierarchical arrangement, and synthesizing as a consideration to determine which variables have the highest priority and act to influence a situation. (Handayani, 2016).

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