DECISION SUPPORT SYSTEM OF TENDER WINNERS USING THE METHOD OF ANALYTIC HIERARCHY PROCESS

by Dwi Agus Apriyanto

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ABSTRACT

The Department of Transportation of East Java Province in fulfilling its duties in the transportation sector conducted the procurement of several projects through the Electronic Procurement Service (LPSE). However, the implementation to determine the quality of tender winners can be improved. Furthermore, the time needed by the committee is quite long in one process of determining the winner. Several criteria become the basis of reference assessment in determining the winner of the project tender including administration, technical, price, and qualifications. The process in determining the winner of the project tender is currently excluding the existing four criteria but rather emphasizes more on the value of one of the superior criteria. Moreover, the company that has been familiar with the work that has been proven will get more value. There is multi-criteria in the case of the assessment, so it needs a method to provide accurate and precise recommendations for the winner of the project tender. This study used the method of the Analytic Hierarchy Process (AHP). Based on the previous studies, the AHP method is considered capable of selecting the best alternative from several alternatives by considering all the criteria used in the assessment. Based on the analysis of the result of the implementation of the AHP method in determining the winner of the project tender, it can be concluded that the AHP method is effective to solve the problem due to the output or result generated are according to the data in the field. This is supported with a match rate of 94%. The AHP method is more efficient in terms of time management because it requires less time.

Keywords: Department of Transportation of East Java Province, Determining the Winner, Tender, Project, Analytic Hierarchy Process (AHP).

1. INTRODUCTION

1.1. Background of the Study

The Department of Transportation of East Java as one of the government agencies certainly has the main functions and duties. Issued in the Regional Regulation of East Java Province Number 9 of 2008 CHAPTER VI Article 9 Paragraphs (2) and (3), the task of the Department of Transportation of East Java Province is to carry out regional government affairs based on the principle of autonomy and assistance tasks in the sector of transportation and road transport traffic (East Java Provincial Government, 2008). In fulfilling its duties, the Department of Transportation carries out several functions including the formulation of technical policies in the sector of transportation and road transport traffic, administration of government affairs and public services in the sector of transportation and road transport traffic, development and implementation of tasks according to the scope of their duties, and the implementation of other tasks granted by the Governor (East Java Provincial Government, 2008).

To fulfill its duties and assistance in the sector of transportation and traffic, the Department of Transportation conducts procurement of several works of projects through Electronic Procurement Services or commonly abbreviated as LPSE. LPSE is a work unit established in all ministries/institutions/regional work units/other institutions to implement a service system of procurement of goods and services in electronic format and facilitate Procurement Service Units, which is abbreviated as ULP/procurement officials in carrying out procurement of goods and services in electronic format (Department of Transportation of East Java Province, 2020). The procurement of goods and services in electronic format will certainly improve quality and minimize the time in each process. However, it can still be improved along with the development of the technological era because most of the process of determining and evaluating still uses human intervention.

There was research in 2010 which compared the auction process of tender projects using manual method and online service. The process of procurement of goods and services in government construction projects needs to be changed from a manual tender process (Presidential Decree/Keppres No. 80 of 2003) to an E-Procurement tender process considering that the efficient, open and competitive government procurement of goods and services is necessary for the availability of goods and services that is affordable and quality so that it will have an impact on improving public services (Presidential regulation/perpres No. 54 of 2010). The result of this research found that an E-Procurement auction based on Presidential Decree No. 54 of 2010 is better than the manual auction based on Presidential Decree No. 80 of 2003 (Sukmalaras, Ismail and Farida, 2010).

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Furthermore, Tukan and Kennedy conducted a study on tender auction using an online system. The objective of the study was to make it easier for the parties who want to participate in the tender and the management who held the tender. This study used 2 methods, namely the weighting method and sequential elimination by conjunctive constraint. The results of the study concluded that the system can support the tender committee in making decisions to determine the winner of the tender (Tukan and Kennedy, 2015). However, the system can still be optimized so that it not only helps to ease the task of the committee but it can also provide fast and accurate results.

In another study entitled "The Application of the AHP (Analytic Hierarchy Process) Method to Determine the Quality of Tumbu Sugar (Brown Sugar Cane)", Darmanto et al. applying the AHP method by considering three criteria including hardness, color, and flavor because they are considered effective on the problem by simplifying and accelerating the decision-making process (Darmanto, Latifah and Susanti, 2014).

From the description of the problem, the writer wants to apply the method of Analytic Hierarchy Process which will be abbreviated to AHP method to determine the winner of the project tender in this case assessed by four criteria including administrative requirements, technical proposal, budget plan, and qualifications of companies participating in the tender. In addition to improving the quality and time to determine the winner of the tender, the advantage of the service system of procurement of goods and services in electronic format by applying the AHP method in the system is that it can reduce the error factor caused by humans because all processes are carried out by following the stages and calculations on the AHP method so that it is produced better decision compared to the conventional method. It is expected that using the AHP method can facilitate the organizing committee in the assessment process to determine the winner of the project tender.

It has been proven from several previous studies with the conclusion that the AHP method can be applied and it is effective for a multi-criteria problem. Therefore, the writer wants to apply the AHP method in decision making to determine the winner of the project tender so it can facilitate the assessment process and be more effective and the level of accuracy becomes higher. This study entitled "Decision Support System of Tender Winners Using AHP Method."

1.2. The problem of the Study

Based on the background of the study that has been described, the problems can be formulated as follows:

1. How is the quality/effectiveness of applying the AHP method to determine the winner of a project tender?
2. What is the level of compatibility between the results of applying the AHP method in determining the winner of the project tender compared to the previous research?
3. How about the time efficiency in determining the winner of the project tender?

1.3. Objectives of the Study

The aim of this research is :
1. To analyze the quality/effectiveness of applying the AHP method to determine the winner of the project tender.
2. To analyze the level of compatibility of the results of the application of the AHP method in determining the winner of the project tender compared to the previous research
3. Analyze the time efficiency in determining the winner of the project tender.

1.4. Benefits of the Study

The benefit of this research is that it is expected that by applying the AHP method, it can facilitate the executive committee and be more effective in determining the winner of the project tender.

1.5. Limitations of the Study

There are limitations to the problem of this study, namely:
1. Data used from the Department of Transportation of East Java Province are in the form of names of companies participating in the procurement of goods and services at LPSE throughout 2019.
2. Output in the form of a list of recommended companies based on the evaluation of four criteria, namely:
   a. Administrative requirements
   b. Technical Proposal
   c. Budget plan
   d. Qualification

2. LITERATURE REVIEW
2.1. Literature Review

Table 2.1 Table of Comparison of Previous Research

No.	Researcher	Title	Method	Variable	Conclusion
1.	Fauzha Rahmasari and Imam Nurhadi Purwanto	Determination of Tender Winners in Electronic Format Hosting Internet 10 Mbps Using Weighted Product (WP) and Analytic Hierarchy Process (AHP) methods (A Case Study on National Institute of Aeronautics and Space (LAPAN), Rumpin)	Weighted Product (WP) and Analytic Hierarchy Process (AHP) Method	Administration, Technical, Price, Qualification	National Institute of Aeronautics and Space (LAPAN), Rumpin) (Rahmasari and Purwanto, 2014)
2.	Nugroho Agung Prabowo	Decision Support System as Partner Selection Analysis of Procurement of Goods and Services at Semarang State Polytechnic	Analytic Hierarchy Process (AHP)	Financial, Experience, Past Performance, Management and Organization	Semarang State Polytechnic (Prabowo, 2009)
3.	Peggi Sri Astuti and Retantyo Wardoyo	Decision Support System to Determine the Tender Winners of Construction Work Using the Method of Fuzzy AHP	Fuzzy Analytic Hierarchy Process (AHP)	Administration (AD), Technical (TK), Price (HG), Qualification (KL)	University of Udayana, Bali (Sri Astuti and Wardoyo, 2014)
4.	Saripah and Abdullah	Decision Support System of Selection of Prospective Tender Winners Project Using the Analytic Hierarchy Process (AHP) Method on Public Works Service of gragiri Hilir Regency	Analytic Hierarchy Process (AHP)	Administration, Technical, Price	Public Works Service of gragiri Hilir Regency (Saripah and Abdullah, 2015)
5.	Durotun Nafisah	The Application of Simple Additive Weighting Method for Support System to Determine Tender Project Winners at Pt.Tri Tunggal Sinar Mas Tangerang	Simple Additive Weighting (SAW)	Administration, Technical, Price	At PT. Tri Tunggal Sinar Mas Tangerang (Nafisah, 2015)
6.	Elbert Jonathan, Djoni Haryadi Setiabudi, Yulia	Tender System Using the Method of Analytical Hierarchy Process (AHP) in the Provision Unit of Universitas Kristen Petra	Analytic Hierarchy Process (AHP)	Work Experience, Work Management, Specification, Time proposal, Work/Delivery, and Price	Provision unit of Universitas Kristen Petra (Jonathan, Setiabudi and Yulia, 2019)
7.	Romi Hardianto and Rometdo Muzawi	Decision Support System to Determine Contractor Tender Winners Using the AHP Method (Case Study in Department of Public Works of Agam Regency)	Analytic Hierarchy Process (AHP)	Finance, Management, Experience, Personnel, Equipment	Department of Public Works of Agam Regency (Hardiyanto and Muzawi, 2016)
8.	Lita Asyriati Latif, Said Hi Abbas, Mohamad Jamil	Development of A Web-Based Decision Support System Application in Determination of Tender Winners Using the Bayes and Group Technology Method	Bayes and Group Technology Method	Administration, Technical, Finance	Procurement Services Unit (ULP) of Khairun University (Latif, Abbas and Jamil, 2017)
9.	Erika Susilo	Decision Support System for Licensing and Placement of Floating Net Pool Using AHP Method Case Study of PT. PJB Cirata of Reservoir Management Agency of Cirata	Analytic Hierarchy Process (AHP)	Administration, Profile, Management	PT. PJB Cirata of Reservoir Management Agency of Cirata (Susilo, 2011)
10.	Eko Darmanto, Noor Latifah, Nanik Susanti	Application of the AHP (Analytic Hierarchy Process) Method to Determine the Quality of Palm Sugar	Analytic Hierarchy Process (AHP)	Hardness, Color, Taste	Palm Sugar Producers in Central Java (Darmanto, Latifah and Susanti, 2014)

2.2. Literature Review

A. Project

Projects are efforts organized to achieve important goals, targets and expectations using budgetary funds and available resources, which must be completed within a certain timeframe (Donald, 1987).While according to Hayun (2005), projects are a combination of resources, such as people, materials, equipment and capital/costs collected in a temporary organization to reach targets and goals.

B. Tender

The definition of tender is the implementation of a building in field of contracting of construction services/ also often called as an auction, which is one of the systems of procurement of goods and services (Hayun, 2005). In the field of construction services, the implementation tender is carried out by the assignor/ project owner, by inviting some contracting companies to obtain one winner who is able to carry out the work according the specified requirements at a reasonable price.

C. Analytic Hierarchy Process (AHP)

The working principle of AHP is the simplification of a complex, unstructured, not strategic problems, and compatibility becomes its parts and organizing in a hierarchy (Fitria, 2008). Afterwards, the importance level of each variable is given a subjective numerical value regarding the relative importance of the variable compared to other variables. Based on these various considerations, a synthesis is then carried out to determine the variables that have high priority and have a role to influence the results of the system.

In general, the steps that must be taken in using the AHP method for solving a problem are as follows (Kusrini, 2007):

1. Defining the problem and determining the desired solution, followed by arranging the hierarchy of the problems face

2. Checking the consistency of the hierarchy. If the value is more than 10%, the assessment of judgment data must be improved. However, if the consistency ratio (CI/IR) is less or equal to the calculation results can be declared correct. The list of Index Random Consistency (IR) values can be seen in the following Table 2.1.

Table 2.1 List of Index Random Consistency values

Number of Criteria (n)	IR Value
1	0
2	0
3	0.58
4	0.9
5	1.12
6	1.24
7	1.32
8	1.41
9	1.45
10	1.49
11	1.51
12	1.48
13	1.56
14	1.57
15	1.59

3. The selection criteria referred to in this study are assessment criteria in determining the winner of the project tender, such as administration, technical, price and qualifications. The following assessment criteria are shown in Table 2.2

Table 2.2 Assessment Criteria

Assessment Criteria	Value Criterion
Administration	Very Suitable
	Suitable
	Not suitable
Technical	Very Suitable
	Suitable
	Not suitable
Price	Very Suitable
	Suitable

	Not suitable
	Very Suitable
	Suitable
Qualifications	Not suitable

4. Making comparisons between elements, which is the criteria. The comparison between criteria is intended to determine the weight for each criterion.
5. Calculating the matrix of value criterion by using the formula for new column row value = Old column row value/ number of each old column.
6. Calculating Consistency Index (CI). The consistency equation can be seen in equation 1:

$$CI = \frac{(\lambda\,max - n)}{n} \dots\dots\dots\dots\dots\dots\dots\dots\dots(2\text{-}1)$$

Notes
n = the number of elements.

7. Calculating Consistency Ratio (CR). The consistency ratio calculation equation can be seen in equation 2:

$$CR = \frac{CI}{CR} \dots\dots\dots\dots\dots\dots\dots\dots\dots(2\text{-}2)$$

Notes
CR = Consistency Ratio
CI = Consistency Index
IR = Index Random Consistency

3. RESEARCH METHODS

In this research methodology section, the methods used in the preparation of the study will be discussed, including the literature review, needs analysis, research objects, methods of data taking and collection, data processing, the order of tender winner recommendations, conclusions and suggestions. The following is a flow explaining the methodology used as shown in Figure 3.1 below:
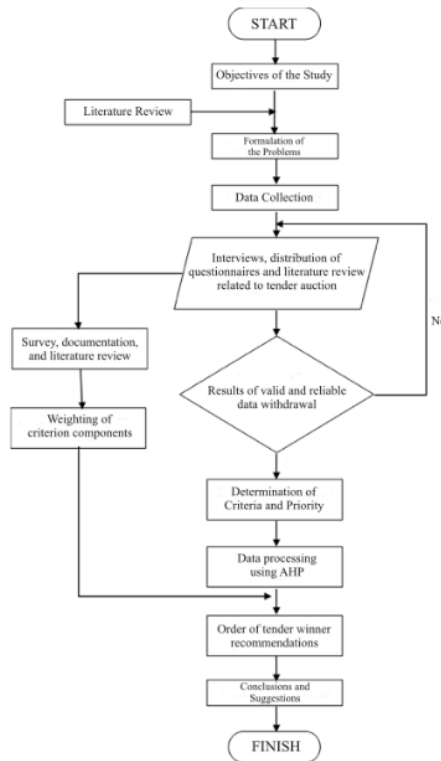
Figure 3.1 Flow Chart of the Methodology

Based on the figure above, it can be concluded that the method of preparing the study is as follows:
a. Determining the objectives of the study.

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b. Literature Review: Reviewing the basic theories related to decision support systems, projects, tenders, Analytic Hierarchy Process (AHP).
c. Formulating the problem.
d. Collecting data needed with the research object of the Department of Transportation of East Java Province.
e. Carrying out data processing by making a decomposition of the problem hierarchy, determining goals and finding the right value criterion that can achieve the goal.
f. Processing data that has been processed using the AHP method to determine the winner of the project tender.
g. Conducting testing to measure the level of compatibility and the resulting effectiveness.
h. Carrying out analysis based on the output produced.
i. Drawing conclusions.

4. DATA ANALYSIS and DISCUSSION

4.1. Hierarchical Structure of AHP Method

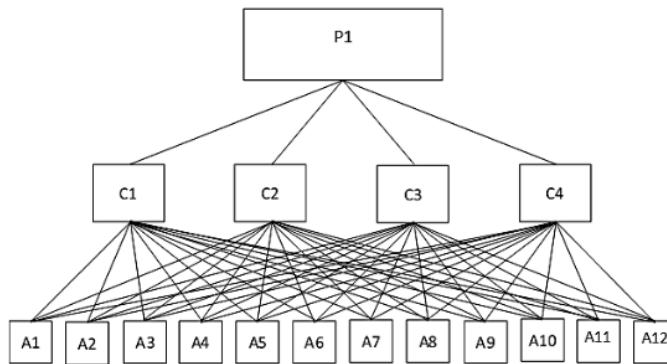The following hierarchical structure will be used in the AHP method process.

Figure 4.1 Hierarchical Structure of AHP Method on the Project

Tabel 4.1 Notes

Symbol	Notes
P1	Project 1 is the Arrangement of a Master Plan for the Development of the Gili Ketapang Seaport Probolinggo Regency
C1	Criteria 1 of Administration
C2	Criteria 2 of Technical
C3	Criteria 3 of Price
C4	Criteria 4 of Qualification
A1	Company Alternative 1 of PT. Tata Guna Matra
A2	Company Alternative 2 of CV. Jaya Sukses Sejahtera
A3	Company Alternative 3 of CV. Dinamika Raya
A4	Company Alternative 4 of PT. Rancang Persada
A5	Company Alternative 5 of PT. Delta Buana
A6	Company Alternative 6 of PT. Griya Teknika
A7	Company Alternative 7 of CV. Geo Plano
A8	Company Alternative 8 of PT. Konindo Timur Utama
A9	Company Alternative 9 of PT. Ika Adya Perkasa
A10	Company Alternative 10 of PT. Surya Abadi
A11	Company Alternative 11 of PT. Surya Cahya Utama
A12	Company Alternative 12 of CV. Tigage

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With hierarchy, a complex problem can be deciphered into groups that are subsequently arranged into a hierarchical form so that the problem will appear more structured and systematic.

4.2. Flowchart of AHP Method

A flowchart is an algorithm process or flow that are represented in the form of graphic symbols and their sequences by combining each step using arrows, aiming to help users to find out the information.
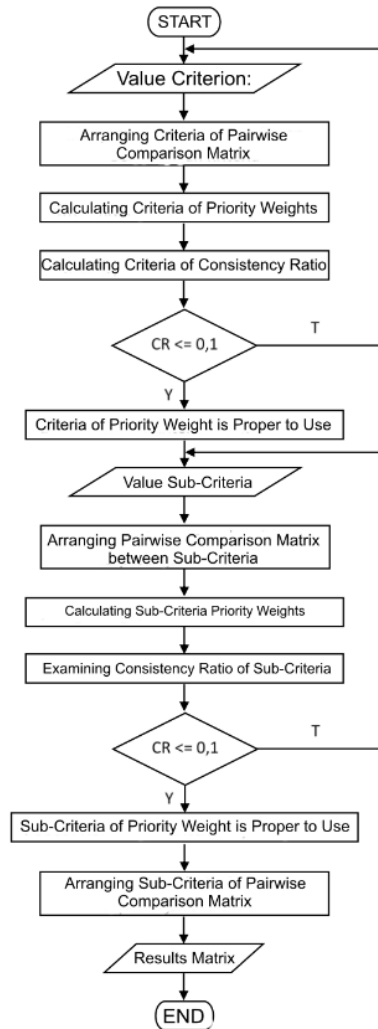
Figure 4.1 Flowchart of AHP Method

4.3. Settlement Using AHP Method

The manualization of AHP method functions to provide a calculation of the decision to determine the winner of the project tender manually. The steps are as follow:

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A. Arranging a pairwise comparison matrix between criteria. The first thing to do is to decide the weights for the four criteria according to their importance level. Next, the four criteria are compared with each other. The four criteria include administration, technical, price and qualifications

Table 4.2 Pairwise Comparison Matrix between Criteria

	K1	K2	K3	K4
K1	1	2	3	5
K2	0,5	1	3	5
K3	0,33	0,33	1	2
K4	0,2	0,2	0,5	1

B. Calculating the criteria weights. The calculation process results in the criteria weights as follows.

Table 4.3 Criteria Priority Weights

Criteria	Priority Weights
Administration	0,461
Technical	0,328
Price	0,136
Qualifications	0,075

C. Making a sum matrix for each row
D. Calculating the Consistency Ratio (CR). The consistency ratio test should not be more than 0.1. If the results of the consistency ratio test exceed 0,1, then a pairwise comparison matrix is calculated. The results of the consistency ratio test are as follow.

Table 4.4 Calculating Results of Consistency Ratio

λ max	0,5
CI	-1,167
CR	-1,296

$$CI = \frac{\lambda \max - n}{n - 1} = \frac{0,5 - 4}{4 - 1} = -1,167$$

$$CR = \frac{CI}{RI} = \frac{-1,167}{0,9} = -1,296$$

E. Calculating the weights of the sub-criteria. Three sub-criteria are very suitable, suitable, and less suitable.

Tabel 4.5 Pairwise Comparison Matrix between Sub-Criteria

	SK1	SK2	SK3
K1	1	3	5
K2	0,33	1	3
K3	0,2	0,33	1

F. Obtaining a weighting matrix for each criterion

Tabel 4.6 Results Matrix

	K1	K2	K3	K4
SK1	1,000	1,000	1,000	1,000
SK2	0,411	0,575	0,459	0,466
SK3	0,168	0,220	0,156	0,129

G. Converting the results of manual marking of each company using the weights of the results matrix.
H. Example of conversion of r assessment results: PROJECT 1 Arrangement of River Pier Development Planning in Surabaya.
I. In project 1 of River Pier Development Planning in Surabaya, the calculation using the following AHP method is done:

Tabel 4.7 Original Data of Participating Companies

Company Name	Status
PT. Konsalta Kuatorial	-
CV. Santiadji Langgeng	-
CV Karya Sejahtera Abadi	-

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PT. Kusuma Bangun Karya	-
PT. Wijoksono Jaya Sakti	-
CV. Chatur Pilar Hutama	-
PT. Duta Bhuana Jaya	-
PT. Prospect Engineering	-
CV. Padi Cipta Mandiri	-
CV. Dwi Purnama	-
CV. Indoraya Surabaya	-
CV. Graha Guna Gatra	P

Notes
P   : Winner

Table 4.8 Assessment of Participating Companies

Company name	Administration	Technical	Price	Qualifications
PT. Konsalta Kuatorial	95	85	70	88
CV. Santiadji Langgeng	87	80	75	78
CV Karya Sejahtera Abadi	78	80	55	75
PT. Kusuma Bangun Karya	78	75	66	85
PT. Wijoksono Jaya Sakti	76	85	87	58
CV. Chatur Pilar Hutama	90	81	55	74
PT. Duta Bhuana Jaya	87	89	73	70
PT. Prospect Engineering	80	58	75	80
CV. Padi Cipta Mandiri	78	75	80	58
CV. Dwi Purnama	77	75	65	80
CV. Indoraya Surabaya	90	70	83	77
CV. Graha Guna Gatra	87	85	88	85

Table 4.9 Conversion of Assessment

Value	Status	Code
$80 \leq x \leq 100$	Very Compatible	SC
$60 \leq x < 80$	Compatible	C
$0 \leq x < 60$	Less compatible	KC

Table 4.10. Assessment Conversion Result of Participating Company

Company Name	Administration	Technical	Price	Qualifications
PT. Konsalta Kuatorial	SC	SC	C	SC
CV.Santiadji Langgeng	SC	SC	C	C
CV Karya Sejahtera Abadi	C	SC	KC	C
PT. Kusuma Bangun Karya	C	C	C	SC
PT. Wijoksono Jaya Sakti	C	SC	SC	KC
CV. Chatur Pilar Hutama	SC	SC	KC	C
PT. Duta Bhuana Jaya	SC	SC	C	C
PT. Prospect Engineering	SC	KC	C	SC
CV. Padi Cipta Mandiri	C	C	SC	KC
CV. Dwi Purnama	C	C	C	SC
CV. Indoraya Surabaya	SC	C	SC	C
CV. Graha Guna Gatra	SC	SC	SC	SC

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Table 4.11 Final Assessment Result of Participating Company

Company Name	Administration	Technical	Price	Qualifications	Total
PT. Konsalta Kuatorial	0,461	0,328	0,063	0,075	0,926
CV.Santiadji Langgeng	0,461	0,328	0,063	0,035	0,886
CV Karya Sejahtera Abadi	0,189	0,328	0,021	0,035	0,574
PT. Kusuma Bangun Karya	0,189	0,189	0,063	0,075	0,515
PT. Wijoksono Jaya Sakti	0,189	0,328	0,136	0,01	0,664
CV. Chatur Pilar Hutama	0,461	0,328	0,021	0,035	0,845
PT. Duta Bhuana Jaya	0,461	0,328	0,063	0,035	0,886
PT. Prospect Engineering	0,461	0,072	0,063	0,075	0,67
CV. Padi Cipta Mandiri	0,189	0,189	0,136	0,01	0,524
CV. Dwi Purnama	0,189	0,189	0,063	0,075	0,515
CV. Indoraya Surabaya	0,461	0,189	0,136	0,035	0,821
CV. Graha Guna Gatra	0,461	0,328	0,136	0,075	1

J. The Example of assessment conversion result of PT. Konsalta Kuatorial is as follow

$$Administration = Sub\text{-}criteria\ weight * Criteria\ Weight$$

$$= 1.000 * 0.461$$

$$= 0.461$$

K. After converting the assessment into weight that has been calculated before, it is obtained from each participating company. From this column, the highest score/value and a winner are found. In project 1, the maximum value is obtained by CV. Graha Guna Gatra. Thus, the company won the tender for project 1. This is in accordance with the original data so that it can be considered that the level of compatibility in Project 1 is equal to 100%.

4.4   Result Analysis

From the examination conducted toward 10 projects in The Department of Transportation of East Java using AHP method, it is obtained the result below:

Table 4.12 List of Project Compatibility Level

No.	Company Name	Compatibility Level
1	Planning the construction of a river pier in Surabaya	100%
2	DED of construction of Gili Genting Port	100%
3	Review of RIP (port master plan) of Probolinggo Port	100%
4	DED of Paciran Port Passenger Support Facilities	100%
5	Design of port master plan of Bawean Gresik crossing	100%
6	Review of port master plan of Prigi Port	70%
7	Mapping Study of DLKr(Work Environment Area) /DLKp (Interests Area) of Paciran Port	70%
8	Feasibility Study (FS) of Sendang Biru Port	100%
9	DED of Masalembu Port	100%
10	Feasibility Study (FS) of Jember Port	100%

Table 4.4.13 Assessment Scheme of AHP Calculation Result

No.	Condition	Value
1.	AHP calculation result gives winner order based on original data.	100%
2.	AHP calculation results give the order of the winners according to the original data but there are 2 alternatives as winners.	70%
3.	AHP calculation results give the order of the winners according to the original data but there are more than 2 alternatives as winners.	50%
4.	The AHP calculation results contained duplicate winners and the order does not compatible to the original data.	30%
5.	The AHP calculation results give the order of the winners that is completely incompatible with the original data	0%

From Table 4.13, it is obtained list of project compatibility level of AHP calculation compared to original data in field. Next, the global compatibility level is calculated to assess the effectiveness of the AHP method used.

$$\text{AHP Effectiveness Value}$$

$$= \frac{\text{Value of total compatibility level}}{\text{Total project}}$$

$$= \frac{940\%}{10}$$

$$= 94\%$$

The application of AHP method in determining winner of project tender can be considered effective because the output produced is the company that has the best assessment component and compatible to the original data in the field. To test the compatibility of the AHP method outputs and the original data in the field, the percentage of compatibility is 94%. From the analysis, incompatibility occurs because the AHP assessment output puts more than 1 company with the highest score. However, with the presentations, the AHP method has been proven effective in giving winners recommendations based on an evaluation of the four criteria, they are administrative, technical, price and qualifications. AHP method is considered to be effective because it can achieve the desired goals before.

Furthermore, AHP method can be considered more efficient because using AHP method does not take long time rather than previous process. This is because the determination of the tender winner using the AHP method already has had a determination framework in order to facilitate the committee and can reduce the time to determine the tender winner. The greatest value of the assessment results using the AHP method shows that the company is the recommended winner in the project tender.

5.   CLOSING
5.1   Conclusion
Based on result analysis of the application of the AHP method to determine the winner of the project tender that has been conducted, conclusions can be drawn below:
1. The application of AHP method in determining winner of project tender is considered effective because the output resulted is compatible to the original data in the field. In determining the winner, the AHP method evaluates based on several criteria, such as administrative, technical, price and qualifications.
2. The level of compatibility between the results of applying the AHP method to determine the winner of the project tender is 94%. The level of compatibility of the results is obtained because there are 2 of 10 projects that are less compatible. Incompatibility in this means the name of the winning company in the original data. There is only 1 company while in the assessment using the AHP method, there are more than 1 company (same high value).
3. The process of determining the winner of a project tender using the AHP method can also be considered more efficient in terms of time management when compared to the previous manual assessment process.

5.2   Suggestion
The suggestions that can be given to improve further research are as follow:
1. Adding other criteria in order to support the process of determining the winner of the project tender and improve the compatibility of the results.
2. Adding assessment details and reduce the rating range for each sub criteria.

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3. Developing methods and combining other methods because in solving these multi-criteria problems, the AHP method is not the only way.

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