

DECISIONS ANALYSIS OF CONTRACTOR SELECTION PT. ERICSSON INDONESIA USING ANALYTICAL HIERARCHY PROCESS METHOD

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ABSTRACT

Selection of contractors is one of the important things in the completion of a project activity for the company. Selection of contractors is a multi-criteria problem that includes both quantitative and qualitative factors. One method that can be used for the selection of contractors is the AHP (Analytical Hierarchy Process) method. This research is conducted in PT Ericsson Indonesia one of the telecommunication vendors that will develop the partnership relationship with the service provider contractor Installation, troubleshooting and commissioning. In this research will be discussed some of the problems are what criteria are the benchmarks of contractor selection at PT Ericsson Indonesia and which criteria are priority in contractor selection, how is the assessment or priority to the contractor for each criterion used as the benchmark of contractor selection, which contractor should be selected for working on telecommunication projects in PT Ericsson Indonesia, and what are the advantages of the AHP method compared to the previous contractor selection. The samples of this study are the decision makers and those within the department who know the contractor's performance. Sampling knots using judgment sampling because the AHP method requires dependence on a group of experts according to the type of related specialist in decision making.

This research uses AHP method assisted by expert choice software. The results of the assessment of the importance of the criteria in the selection of contractors resulted in the following priority / weighting scales: priority I quality (0.409), priority II price (0.199), priority III capacity (0.148), priority IV Tools (0.077), priority V capability (0.069), priority VI experience (0.037), priority VII finance (0.035) and priority VIII OHS (0.026). From the result of the assessment of the level of alternative interest in the selection of contractors, the ranking scale is as follows: 1st rank of contractor Telaga Pitu (0.467), rank II Synergy contractor (0.322), rank III contractor One Zero (0.211). This study also found that the selection of contractors with AHP method is better than the selection of contractors that already exist

in PT.Ericsson Indonesia, because in AHP method there is consistency factor in the assessment, there is a measurement scale to get scores and priorities that can be measured simultaneously where in an existing method, it is not available.

Based on the above analysis, the suggestion that can be given is, if the company will develop relationship with the contractor, the company can use AHP method for contractor selection, and the company is select Telaga Pitu contractor as the contractor for the company because the contractor is judging criteria as the contractor with the highest overall value. With this partnership, it is expected to help Ericsson Ericsson company in completing the project target provided by the operator.

Key Words: contractor selection, Analytical Hierarchy Process (AHP), telecommunication project

1. INTRODUCTION

Development of telecommunication network infrastructure be it 2G, 3G and now 4G requires a lot of funds. Ericsson Indonesia as one of the providers of mobile device and infrastructure in this case plays an important role in assisting telecommunication operators in Indonesia in providing telecommunication network services in question. The construction of this telecommunication infrastructure network involves vendors and contractors. Vendors are companies that provide technology required by telecommunications operators, while contractors are third parties designated by vendors to work on Installation Troubleshooting & Commissioning (ITC).

The selection of contractors is an important part of completing the telecommunication infrastructure project, as this will have a positive impact on Ericsson Indonesia to complete the projects obtained from mobile operators. In Indonesia alone Ericsson has a large project which is obtained from 3 (three) telecommunication operators in Indonesia, namely Telkomsel, Indosat and XL. The current role of contractors has not been able to contribute maximally to Ericsson, so that appropriate contractor selection is required according to the desired criteria to complete the infrastructure project on time. One method that can be used for the selection of telecommunication contractors is the AHP (Analytical Hierarchy Process) method. The advantages of this method is to make the problem wide and unstructured into a flexible and easy to understand model, solve complex problems through system approach, can be used on the elements of the system are mutually free and does not require linear relationship, providing the measurement scale and method to get priority, consider the logical consistency in the assessment used to determine priorities, lead to an overall estimate of how desired each alternative, can consider the relative priority of factors in the system so that people are able to choose the best alternative based on their objectives, taking into account endurance or resilience output sensitivity analysis of decision-making, and taking into account the validity up to the limit of inconsistency tolerance of the various criteria and alternatives chosen by the decision maker.

2. LITERATURE REVIEW

2.1 OPERATIONS MANAGEMENT

Operations Management (OM) is a series of activities to achieve value in the form of goods and services through transformation of inputs into outputs. Activity is a process or set of activities that require one

or more of the inputs, change and add value to the input, to provide one or more outputs for the customer. Input consists of human resources (labor), model (equipment and facilities), purchasing raw materials and services, land and energy, while its output is goods and services.

Some definitions of operations management include "*Operations Management is an activity related to the creation of goods and services through the process of transformation from input to output.* (Heizer and Render, 2015:3).

2.2 UNDERSTANDING THE PROJECT

Another notion according to Schwalbe (Dimiyati and Nurjaman, 2014:2), explains that the project is a temporary venture to produce a unique product or service. In general, the project involves several people who are interconnected in their activities and the main sponsor of the project is usually interested in the effective use of resources to accomplish the project efficiently and on time.

According to Schwalbe (Dimiyati and Nurjaman, 2014:21), each project will be limited by scope, time and cost. These limitations are often used into project management as the three main constraints. For the project to succeed, the project manager should consider the following. First, the scope of work to be undertaken as part of the project, as well as the products and services or results desired by the customer (sponsors) that can be generated in a project. Second, the time required to complete a project. Third, the cost required to complete a project. Each project has a specific purpose, and in the process of achieving that goal there are three constraints to be met, known as Tradeoff Triangle or Triple Constraints

2.3 DECISION MAKING

The development of DSS (Decision Support System) began in the late 1960s with the existence of computer users on time sharing (based on time division). At first one can interact directly with a computer without having to go through an information specialist. Time sharing opens up new opportunities in computer use. It was not until 1971 that the term DSS (Decision Support System) was found, in a journal entitled "A Framework for Management Information System" the need for a framework to channel computer applications to management decision making. based his framework on the type of decision according to Simon and the management level of Robert N. Anthony (Gorry and Morton, 1971).

2.4 ANALYTICAL HIERARCHY PROCESS (AHP)

Analytical Hierarchy Process (AHP) was developed by Thomas L. Saaty in the 1970s. This method is one of the multi-criteria decision-making models that can help the human mindset in which logic, experience, knowledge, emotion, and sense factors are optimized into a systematic process. AHP is a decision-making method developed to prioritize several alternatives when several criteria must be considered and allow decision makers to construct complex problems into a hierarchy or set of integrated levels. Basically, AHP is a method used to solve complex and unstructured problems into its groups, by organizing the group into a hierarchy, then entering numerical values instead of human perception in comparative comparison. With a synthesis it will be able to determine which element has the highest priority (T.L Saaty, 2008).

2.5 CONTRACTOR SELECTION

The process of selecting contractors (Arisanto, 2012:32) is a series of activities ranging from identifying the needs of contractor services by the owners, preparing auction package, auctioning, until the contract signature to handle the project's physical implementation. The selection process involves research and evaluation work, which often reaches internal organizational issues, such as personnel and contractor finance. This is done considering the successful handling of large and complex projects, much dependent on the financial position and quality of personnel performing important work such as project managers, construction managers, purchasing managers and others. Given the size of the resources involved, as well as the risks faced, then to get a contractor who is expected to perform the tasks assigned, it needs to be applied strict selection (Soeharto 2011). For large projects and using a fixed price contract form, it is common to take an approach by conducting pre-qualification followed by giving the auction package to the graduating candidate, then evaluating the proposal to determine the winner (Soeharto 2011).

2.6 EXPERT CHOICE TOOLS

In this research will use Expert Choice tool software. This software is a system used to perform analysis, systematic, and justification of a complex decision evaluation. Expert Choice has been widely used by various business and government agencies around the world in various forms of application. By using expert choice, there is no more trial and error in the decision-making process. Based on Analytical Hierarchy Process (AHP), the use of hierarchy in expert choice aims to organize estimates and intuitions in a logical form. This hierarchical approach allows decision makers to analyze all options for effective decision-making.

2.7 PREVIOUS RESEARCH

Several previous researches using decision-making analysis in selecting contractors using AHP are mostly used for construction contractors. In the preparation of this thesis, the authors take some of the literature used as a reference in theory and methods used.

Table 1 Comparison Previous Research

Title	Author	Description	Result of Research	Source	Difference	similarity
Selection of Latex Based Rubber Based Rubber Products And Its Strategy Formulation Using AHP Method, Fuzzy AHP and Fuzzy Logic	Dedy Sugiarto (2012) Jakarta	Selection of agricultural products based on potential latex	Downline rubber-based downstream products that are potential to be developed are gloves (medical or household) followed by adhesive and foam rubber	Writing Paper Doctoral Program of Agricultural Industrial Technology, IPB, 2012	Application of Fuzzy AHP and Fuzzy Logic	AHP Method
AHP Application As Lecturer Selection DSS Model	Adriyendi (2011) Padang	Selecting lecturers based on predetermined criteria	AHP Application As Lecturer Selection DSS Model	National Seminar on Information Technology Applications 2011, Yogyakarta, 17-18 June	Criteria used	expert choice & AHP
Fuzzy Decision Model for Construction Contractor's Selection in Egypt: Tender Phase.	H. S. Hassaan (2013)	Determine the contractor for the construction project	The assessment of financial stability as most important in selecting contractors is consistent with the general attitude within Egypt.	Industrial Engineering and Engineering Management (IEEM), 2013 IEEE International Conference on	Metode F-AHP	Some criteria
Analysis of Selection of Indosat Telecom Implementation Project In PT Nokia Siemens Networks	Arisanto (2012)	Define contractor for telco project	From result of calculation by AHP method got Intisel Produktifkom have highest value so that chosen as project implementer of Telecom Implementation Indosat at Nokia Siemens Network.	Writing Master Program Master of Management Telkom University	Subcriteria and software used	AHP Method
A Fuzzy AHP based evaluation method for vendor-selection	Hui Bai (2008) China	Menentukan vendor dalam supply chain manajemen	The paper presents a method to assess vendors based on a set of assessment indices, in which fuzzy numbers are used to handle the fuzzy elements. Compared with traditional AHP method, the fuzzy AHP is an effective method to valuate vendors because it has the capability to capture the vagueness of human judgment.	Management of Innovation and Technology, 2008. ICMIT 2008. 4th IEEE International Conference on	Criteria Determination	AHP Method
Evaluating Vendor's Performance in Outsource Software Development Risks Using Analytic Hierarchy Process Technique	Aziz Deraman (2014)	Identify risk using AHP method	main risk in software engineering is Bond and Relationship	2014 8th Malaysian Software Engineering Conference (MSECC)	Criteria Determination	AHP Method
Optimal Vendor Selection Using Fuzzy Case Based Reasoning	Feng Na dkk (2011)	Determine the vendor in the supply chain management	To improve the vendor selection efficiency, a two levels vendor selection model is proposed through case-based reasoning method	(IJACS) International Journal of Advanced Computer Science and Applications, Vol. 6, No. 4, 2015	Location and criteria determination	AHP Method
Vendor Selection Using Fuzzy C Means Algorithm and Analytic Hierarchy Process	M. S. Q. Zulkar Nine dkk (2009)	Determine the vendor in the supply chain management	The VFA algorithm has successfully addressed the problem of the analytic hierarchy process (AHP) and reduced computational time when a huge number of vendors present to compete.	Fuzzy Systems, 2009. FUZZ-IEEE 2009. IEEE International Conference on	Location and criteria determination	AHP Method

3. METHODOLOGY

Based on research objectives, this research includes explanatory research, which explains criteria and alternatives to the contractor selection process. A quantitative approach is used with AHP method to get the result of analysis from this research.

3.1 PARTICIPANTS

The population in this study are employees working at Ericsson Indonesia who, all populations are subjects of research those directly involved in the determination of the ITC contractor are as follows:

- | | |
|---|------------|
| a) ASP Manager | (1 person) |
| b) Strategic Sourcing Manager/Procurement | (1 person) |
| c) Customer Project Manager | (1 person) |
| d) FSO & ASP Management | (1 person) |
| e) RAN Design Manager | (1 person) |
| f) Network Design Manager | (1 person) |
| g) Transport Design Manager | (1 person) |
| h) Optim Manager | (1 person) |
| i) Advanced Engineer / Logistic /Supply | (1 person) |

In this research the sampling technique uses saturated sampling technique, because the population used is relatively small. Using 3 telecommunication contractors namely SatuNol, Synergy & Telaga Pitu.

3.2 MEASUREMENTS

In this paper, we use the AHP method through expert choice tool. Perform steps of the AHP method for the selection of contractors as below:

1. Preparation of hierarchy
2. Create a pairwise comparison matrix that describes the relative contribution of each element's influence to each of the above-stated criteria objectives.
3. Calculate the weight / priority of each variable at level 1 (criteria) are price, Capacity, Quality (performance card), Capabilities, Tools and machinery, Financial stability, Experience / reference, Legal assessment, OHS.
4. Calculate the weight / priority of each variable at level 2 (alternate) is the weight of each contractor compared with each criterion like step 3 above.
5. After knowing the weight of each criterion and score of each contractor then determined the contractor to be selected. The overall value of each contractor is the sum of the total weight of the contractor by the weight of the criterion. The contractor selected is the contractor with the highest score.

3.3 DATA ANALYSIS

- a) Direct observation in Ericsson Ericsson's work environment to collect general data, background, history, organizational structure, and interview people who are closely

connected with the selection of contractors at Ericsson Indonesia to obtain the required criteria and the criteria weighting

- b) Spread the questionnaire, where the questionnaire form used in this study refers to the example questionnaire in Saaty, 1994. While the items that are compared in the questionnaire is the criteria, and the alternative (contractor) used in the selection of contractors at PT. Ericsson Indonesia, this questionnaire was distributed to the respondents. There are 4 respondents for the assessment criteria of ASP Manager, Strategic Sourcing Manager, RAN Design Manager, and Logistics / Supply Manager since only those respondents have the authority, competence and ability to provide criteria to the selection of contractors in the FGD forum. While 9 respondents are used for assessment of contractor alternative that is ASP Manager, Strategic Sourcing Manager, Customer Project Manager, FSO & ASP Management, RAN Design, Network Design Manager, Transport Design Manager, Optimize Manager, Supply. Furthermore, a matrix of pairwise comparison between all contractors in accordance with predetermined criteria where the scaling scale used scale 1 to 9.

Table 2 AHP scoring scale (Saaty, 2008)

Value	Definition	Explanation
1	Equal Importance	Two activities contribute equally to the objective
3	Moderate importance	Experience and judgement slightly favor one activity over another
5	Strong importance	Experience and judgement strongly favor one activity over another
7	Very strong or demonstrated importance	An activity is favored very strongly over another; its dominance demonstrated in practice
9	Extreme importance	The evidence favoring one activity over another is of the highest possible order of affirmation
2,4,6,8	Intermediate Values	Represent Intermediate Values for each element

4. RESULTS AND DISCUSSION

Result of research following AHP method as below:

- a) Preparation of hierarchy

The hierarchical structure of the problem in the selection of contractors in Ericsson Indonesia is as follows

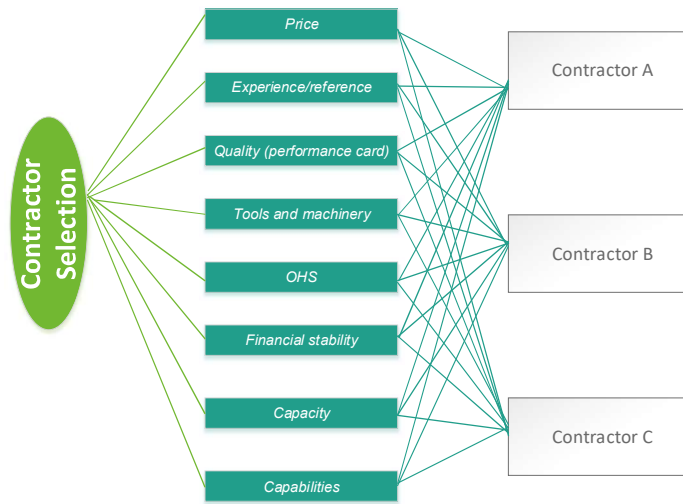


Figure 1 The hierarchy structure of contractor selection criteria

b) Calculating the weight / priority of interest of each criterion variable (price, experience, quality, equipment, OHS, capacity, capability and finance), below is the result of calculation of combination of judgment 4 respondents:

Table 5 Combination judgment of respondents

Criteria	Quality	Price	Capacity	Tools	Capability	Experience	Financial	OHS
Quality	1	4.58258	4.40056	5.91608	5.91608	6.85255	6.43526	7.45391
Price	0.218217685	1	1.18921	5	4.40056	5.91608	5.20681	5.91608
Capacity	0.227243805	0.840894375	1	3.40866	3	3.87298	3.40866	4.78674
Tools & Machinery	0.169030845	0.2	0.293370415	1	1.18921	3	3	5
Capability	0.169030845	0.227243805	0.333333333	0.840894375	1	3	1.96799	4.40056
Experience	0.145931077	0.169030845	0.258199113	1	0.333333333	1	1.18921	2.34035
Financial Stability	0.155393877	0.192056173	0.293370415	0.333333333	0.508132663	0.840894375	1	1
OHS	0.134157778	0.169030845	0.208910448	0.2	0.227243805	0.427286517	1	1
Total	2.2190059	7.380836	7.9769537	17.698968	16.57456	24.909791	23.20793	31.89764

Table 6 weight calculation of each criteria with AHP method

Criteria	Quality	Price	Capacity	Tools	Capability	Experience	Financial	OHS	Total	Average	C. Measure
Quality	0.450652247	0.620875464	0.561659211	0.334261303	0.356937383	0.275094642	0.277287117	0.233682178	3.100449544	0.387556193	9.369708092
Price	0.09834029	0.135486006	0.149080719	0.282502352	0.265500867	0.237500187	0.224354779	0.185470775	1.578235975	0.197279497	9.283270198
Capacity	0.102407931	0.113929421	0.125361138	0.192590893	0.181000282	0.155480229	0.146874797	0.150065647	1.167710339	0.145963792	9.227562447
Tools & Machinery	0.07617413	0.027097201	0.036777249	0.05650047	0.071749115	0.120434572	0.12926616	0.156751409	0.674750307	0.084343788	8.388022369
Capability	0.07617413	0.030788356	0.041787046	0.047510928	0.060333427	0.120434572	0.08479817	0.137958796	0.599785425	0.074973178	8.491808323
Experience	0.065764168	0.022901314	0.032368135	0.05650047	0.020111142	0.040144857	0.051241537	0.073370632	0.362402255	0.045300282	8.643882161
Financial Stability	0.0700286	0.026020924	0.036777249	0.01883349	0.030657385	0.033757585	0.04308872	0.031350282	0.290514235	0.036314279	8.531657708
OHS	0.060458504	0.022901314	0.026189252	0.011300094	0.013710398	0.017153356	0.04308872	0.031350282	0.226151919	0.02826899	8.266258411
Total	1	1	1	1	1	1	1	1		CI	0.110753031

Since the order of the matrix is 8, then for n = 8 the RI value in table = 1.41,

So CRatio = CI / RI = 0.11 / 1.41 = 0.0785 (Consistency value <= 0.1).

From the calculation of pairwise comparison between variables in selecting the contractor above we get the priority weight for criteria shown in the following table:

Table 7 Priority of contractor selection criteria

Criteria	weighting	Priority
Quality	0.409	1
Price	0.199	2
Capacity	0.148	3
Tools	0.077	4
Capability	0.069	5
Experience	0.037	6
Financial Stability	0.035	7
OHS	0.026	8

The table above shows that in choosing a telecommunication contractor for PT. Ericsson Indonesia the first priority is the Quality criterion with the weight of 0.409, then the second priority is the Price with weight 0.199, the third priority is the capacity with the weight of 0.148, the fourth priority is Tools with the weight of 0.077, the fifth priority is the capability with the weight of 0.069, the sixth priority is experience with weight 0.037, seventh priority is financial stability with weight of 0.035 and the last priority is OHS with weight of 0.026.

- c) Calculating the score / Ranking of each variable at level 2 (alternative) is the score of each contractor compared with each criterion.

Table 7 Scoring of contractor based on criteria

Contractor / Criteria	Quality	Price	Capacity	capability	Tools	experience	financial	OHS
Sinergi	0.259	0.376	0.362	0.404	0.36	0.166	0.387	0.356
Telaga Pitu	0.577	0.345	0.454	0.415	0.347	0.605	0.342	0.33
Satu Nol	0.164	0.279	0.183	0.181	0.293	0.229	0.27	0.313

Table 8 Ranking contractor based on criteria

Criteria	Ranking		
	Sinergi	Telaga Pitu	Satu Nol
Quality	2	1	3
Price	2	1	3
Capacity	2	1	3
capability	2	1	3
Tools	1	2	3
experience	2	1	3
financial	1	2	3
OHS	1	2	3

d) Choosing an Optimal Contractor

After each criteria and alternatives are obtained then synthesis is done to get an overall score of the criteria.

Table 8 Result of score Contractor based on criteria

Criteria	Alternative		
	Satu Nol	Sinergi	Telaga Pitu
Capability (L: .069)	0.014	0.022	0.033
Capacity (L: .148)	0.029	0.054	0.064
Experience (L: .037)	0.009	0.006	0.023
Financial Stability (L: .035)	0.009	0.013	0.012
OHS (L: .026)	0.008	0.009	0.009
Price (L: .199)	0.054	0.073	0.073
Quality (L: .409)	0.067	0.106	0.236
Tools & Machinery (L: .077)	0.022	0.028	0.027
Grand Total	0.212	0.311	0.477

So, the scores obtained from each contractor based on predetermined criteria obtained contractor ranking is selected as follows:

Table 9 Final Ranking Score of the contractor

Alternative	Total Score	Ranking
Telaga Pitu	0.467	1
Sinergi	0.322	2
Satu Nol	0.211	3

e) Consistency

With the AHP model that uses human perception as its input, inconsistency may occur because humans have limitations in expressing their perceptions consistently especially if they must compare many criteria. Based on this condition then man can declare the perception will be consistent later or not.

This measurement of consistency is intended to see the inconsistency of respondents' responses. If CR < 0.1 then the pairwise comparison value on the given criterion matrix is consistent.

Table 10 Consistency

Pairwise Comparison	CR	Remarks
Respondent 1 to between weighting criteria	0.07	consistent
Respondent 2 to between weighting criteria	0.09	consistent
Respondent 3 to between weighting criteria	0.08	consistent
Respondent 4 to between weighting criteria	0.07	consistent
the combination of respondents between weighting criteria	0.06	consistent
Combination between alternatives to Quality criteria	0.00181	consistent
Combination between alternatives to Price criteria	0.00001	consistent
Combination between alternatives to capacity criteria	0.00154	consistent
Combination between alternatives to tools criteria	0.00063	consistent
Combination between alternatives to capability criteria	0.001	consistent
Combination between alternatives to experience criteria	0.02	consistent
Combination between alternatives to financial criteria	0.00083	consistent
Combination between alternatives to OHS criteria	0.00063	consistent

From the table above shows that all respondents' assessment is consistent, and calculation will not be repeated.

f) Comparison of Contractor Selection of AHP Methods with Existing Methods

The comparison between the AHP calculation results and the previous contractor calculation results gives different results following table below

Table 11 Comparison AHP Method with existing method

AHP Method	Previous Method	Remarks
Criteria determined by FGD	Criteria determined by FGD	same
The weighting of each criterion is done with judgment information and paired matrices to determine the importance of each criterion, so that there are priorities of each criterion	The weighted value of each criterion is determined directly through the FGD, so it may be that each criterion has an equally important weight depending on the discussion forum	different
Considers the consistency of each respondent, so if it is not consistent then the assessment should be repeated	There is no consistent information from each respondent who gives a score on each of the criteria	different
AHP provides measurement scales and methods for scoring and prioritization	Providing a measurement scale just to get a score of each contractor is not a priority	different
Priority calculation is done simultaneously by directly comparing each contractor alternative	Priority will be obtained after the calculation for each contractor is completed	different

With this research further strengthening previous studies that by using AHP method, Ericsson can use this method to solve multicriteria problems in contractor selection, this method has emerged as a powerful tool that applies to all fields in decision making to choose the best alternative from several alternatives based on selected criteria. In addition, due to its flexibility and efficiency, AHP has been selected as a reliable instrument in decision-making or problem-solving in the field of project management, especially in the selection of contractors, to help Ericsson Indonesia choose a good contractor to be a partner in line with the company's expectations. The results of this study certainly cannot be used as a benchmark for other vendors in choosing a contractor because each vendor has a criteria and weight adjusted to the expectations or goals to be achieved by the company.

5. CONCLUSIONS AND RECOMMENDATIONS

Based on research objectives and research results above it can be concluded the following points:

- a) The most influential criteria in contractor selection at PT Ericsson Indonesia are quality criteria with score 0,409, price with score 0,199 capacities with score 0,148. tools with a score of 0.077. capability with a score of 0.069a experience with a score of 0.037 financial stability with a score of 0.035 and the last is the OHS criteria with a score of 0.026
- b) Telaga Pitu Contractors provide the highest score in the criteria of quality, price, capacity, capability, experience while Synergy gives the highest score against Tools and OHS criteria.
- c) Based on the criteria in the selection of the contractor, the contractor Telaga Pitu is rated as the best contractor with a score of 0.467. Next is the Synergy contractor with a score of 0.322 and One Zero contractor with a score of 0.211, using AHP methods in the selection of contractors can assist the company in saving the tender time because it is systematically done through the comparison of criteria, the input can be flexibly taken from the criteria that can change at any time in accordance with the wishes of the company where the priority of the criteria weight will adjust, because each criterion is compared but in the current selection method, there is no comparison between each criterion, so the weighting cannot be done systematically and flexibly and the time is long when there is a new criterion change because it must determine from the beginning how much weighting should be given.

There are several recommendations that can be obtained in this research, namely:

- a) For the company in the future, if there are new criteria relevant to the company or in accordance with the new company policy, then the company may change or add the criteria.
- b) For further investigators, the researcher may use other criteria that are in accordance with the policies of each company.
- c) To reduce the subjective subjectivity of respondents, particularly to reduce the inaccuracy and uncertainty of respondents in mapping their perceptions into numerical numbers, researchers can use the AHP fuzzy method
- d) Ericsson Company may consider the AHP method for subsequent contractor selection.

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