Supplier Selection in Pt Pelopor Teknologi Implantindo with the Integration of DEMATEL, ANP and TOPSIS Method

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SUPPLIER SELECTION IN PT PELOPOR TEKNOLOGI IMPLANTINDO WITH THE INTEGRATION OF DEMATEL, ANP AND TOPSIS METHOD

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ABSTRACT

A manufacturing company, PT Pelopor Teknologi Implantindo, in its operational activities to meet the needs of implant raw materials 316L and medical devices in collaboration with suppliers, both manufacturers and distributors. The company places more emphasis on short-term attributes such as low costs but is also considering establishing long-term relationships and the possibility of product development collaborations with several suppliers. Therefore, this study aims. First, select a supplier for 316L material using the method DEMATEL (Decision Making Trial and Evaluation Laboratory), ANP (Analytic Network Proces) and TOPSIS (Technique for Others Reference By Similarity to Ideal Solution) from suppliers that match the needs and objectives of the company. Second, identifying the interplay between the DEMATEL, ANP method and identifying criteria using the TOPSIS method. Data collection was carried out through observers and interviews to determine the important variables in the selection of the 316L raw material supplier to categorize them into groups and criteria. Gradually, Questionnaires I and II were used to obtain group consensus and important criteria in selecting suppliers of raw materials in the 316L scrab. Criteria and processed using the Analitycal Network Process (ANP) method with the help of Microsoft Excel software and Super Decisions. Meanwhile, TOPSIS considers both, the distance to the positive ideal solution and the distance to the negative ideal solution by taking relative proximity to the positive ideal solution. Based on comparisons of relative distances, alternative priority arrangements. In this future research will get priority factors on the criteria in selecting suppliers of raw materials Scrab 316L.

Keywords: Suppliers Selection , DEMATEL, ANP and TOPSIS.

1. INTRODUCTION

The fulfillment of raw material for scrab 316L at PT. Pelopor Teknologi Implantindo supplied by more than one supplier. This is done to maintain the availability of materials for the smooth running of the production process. Evaluation of suppliers at PT. So far, Implantindo Pioneer Technology has been applied only from the perspective of the assessment criteria for the reduction of payment, quality. The required supplier reliability is of course not only reflected in suppliers who are able to supply cheap, quality and timely materials, but also must be able to provide optimal service, both in terms of smooth communication and information, responsiveness, and providing convenience in the transaction process. Therefore, companies need to conduct performance evaluations. Implementation of evaluation at PT. Implantindo Technology pioneers carried out using the same weight criteria. Weighting the assessment criteria is very important

because it can show the priority of each performance indicator, so that it can facilitate the management involved in making a decision. Supplier performance evaluation system at PT. Implantindo Technology Pioneer makes it possible to do this by using a number of performance assessment criteria that are interrelated among the evaluation criteria. This is because, PT. Pelopor Teknologi Implantindo is a large company that has quite complex interests in its strategic relationship with suppliers. Based on the company's condition, the company needs a Multi Criteria Decision Making (MCDM) method that can accommodate the linkages between existing criteria.

The MCDM method that is right for use in decision making applications in supplier performance evaluation is the integration of the DEMATEL method and the Analytic Network Process (ANP) method and applies the Technique for Others Reference By Similarity to Ideal Solution (TOPSIS) method. DEMATEL can be used to determine the linkages that occur between supplier performance evaluation criteria. In addition, DEMATEL can also be used to find and analyze the dominant criteria in a system (Tzeng, 2007). ANP is a method that can be used in Multi Criteria Decision Making (MCDM) problems. The ANP method is able to improve AHP weaknesses in the form of the ability to accommodate linkages between criteria or alternatives in the supplier performance evaluation process. With the ANP method, priority weights will be obtained on all the criteria used in evaluating supplier performance. The results of this weighting can be used as input in the final assessment stage of all alternative suppliers based on identified criteria. Meanwhile, TOPSIS Technique Method for Others Reference By Similarity to Ideal Solution is a basic concept of Multi Attribute Decision Making (MADM) which provides the shortest alternative distance from the ideal positive solution and the longest distance from the negative ideal solution.

2. LITERATURE STUDY
2.1 Decision making applications in supplier performance evaluation is the integration (DEMATEL)

DEMATEL was developed in 1972-1976 by the Battelle Memorial Institute as a science and humanitarian program implementation. This method can solve the dependency problem between complex criteria (Lee, 2013). In its development, the DEMATEL method has become one of the best methods that can be used to determine the causal relationship between factors (Tzeng, 2007). This is supported by the statement by (Wu, 2009), that this method is devoted to showing the visualization of the structure of the relationship in a complex matrix. When a company evaluates its implementation, it will find many criteria that must be considered. From these criteria, then a very common problem arises, namely the effect of the relationship between the criteria. Therefore, to make overall improvements in a business unit, it is necessary to identify the relationship between the effects of each criterion so that the criteria will have the greatest influence (Lee, 2013). This statement is the basis for the author to use this method to assist in selecting the right criteria.

2.2 Analytic Network Process (ANP)

Analytic Network Process or ANP is a mathematical theory that allows a decision maker to deal with interrelated factors (dependence) and feedback (feedback) systematically. ANP is one of the methods of decision making based on the multiple criteria or Multiple Criteria Decision Making (MCDM) developed by Thomas L. Saaty. This method is a new approach to qualitative methods which is a continuation of the previous method, namely the Analytic Hierarchy Process (AHP) (Tanjung, 2013). In general, research with a qualitative approach only describes the findings in the field without conducting a deeper synthesis. Moreover, when compared to the AHP

method, ANP has many advantages, such as the resulting comparisons are more objective, the predictive ability is more accurate, and the results are more stable. ANP is more general than AHP which is used in multi-criteria decision analysis. AHP structure is a decision problem in the form of a hierarchical level, while ANP uses a network approach without having to set a level like the hierarchy used in AHP (Tanjung, 2013).

2.3 Technique for Others Reference By Similarity to Ideal Solution (TOPSIS)

The Technique for Others Reference By Similarity to Ideal Solution (TOPSIS) method is a method with the Multi Criteria Decision Making (MCDM) category, which is a decision-making technique from several alternative options, especially MADM (Multi Attribute Decision Making) (Widiyanti, 2013). The Technique for Others Reference By Similarity to Ideal Solution method is the basic concept of Multi Attribute Decision Making (MADM) which provides the shortest alternative distance from the ideal positive solution and the longest distance from the negative ideal solution.

3. INTEGRATION METODE DEMATEL, ANP AND TOPSIS

In the latest literature, the DEMATEL and ANP methods are techniques that can be integrated in order to determine the degree of dependence between criteria and use these results to normalize the unweighted supermatrix in ANP. When the relative weights of the criteria are calculated by using the ANP method only, their degree of interdependence is treated as reciprocal values. In the DEMATEL technique, this level of interdependence does not have reciprocal values, which is similar to real world problems (Yang, 2011). To eliminate this weakness in ANP while calculating relative weights, it can be done by calculating the total relationship matrix in DEMATEL, which can be said to be more profitable (Vujanovic, 2012). Meanwhile, the TOPSIS method can complete a practical decision making, because the concepts offered in this method are simple and easy to understand, efficiency in computation, and the ability to measure relative performance and decision alternatives. In addition, the selection of alternatives is easy to take, where alternatives that have a higher value are higher to be chosen (Juliyanti, 2011).

4. CONCLUSION

The criteria and sub-criteria for selecting a sustainable supplier are obtained from several literature reviews conducted on research on supplier selection at PT Pelopor Teknologi Implantindo. From several criteria and sub-criteria submitted to the expert there are 8 criteria and 16 sub-criteria that have been confirmed by the expert. Based on the results of the integration of the DEMATEL-ANP and TOPSIS methods obtained later will know the rank of the supplier.

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