ABSTRACT

Determination of dam construction for sure will be closely related to the dam constructing criteria. These criteria can be technical and non-technical. The selection of best location/types of dams requires a thorough consideration of the characteristics of each type, as it relates to the physical features of the location (geology) and the adaptation to the objectives of dam that it should serve, security, economy, and other related limitations. Proper dam construction is closely related to water resources management and depends on a set of qualitative and quantitative criteria. This is because: (1). Some criteria are unmeasurable/qualitatively complex; and (2). One criterion has a lot of information (eg geological criteria have complex information). Such problems can be solved by using the Multi-Criteria Decision-Making (MCDM) approach. MCDM is a sub-disciplinary research operation that explicitly evaluates several conflicting criteria in decision making. MCDM is expressed as a decision-making method to establish the best alternative of a number of alternatives based on certain criteria. Some of models included that popular in MCDM until today are: Scoring Model, Analytic Herarchy Process (AHP), Analytic Network Process (ANP), Utility Model, Out Ranking Method, Technique for Others Reference by Similarity to Ideal Solution (TOPSIS) and others.

The MCDM application in relation to the analysis of priorities for dam construction has been widely developed. So it can be concluded that MCDM can be to determine the decision of dam constructing in general. Otherwise there are still some models in the MCDM family that have not been used so it needs to be done studies or related research. From the literature search results, there is no specific research to discuss ANP method for determining priority of dam construction, so this dissertation research will discuss in detail about ANP method for that purpose. The research is carried out by inventorying all the dam development criteria in the longlist, and together with the expert determining the criteria that have a strong influence on the determination of dam construction in Indonesia, and the finding is to develop an appropriate ANP method to determine the dam construction in Indonesia.

This research determines 2 (two) main criteria for dam construction namely technical and non technical criteria. Technical criteria are the dominant criteria by having 5 (five) sub-criteria below: geology, topography, effectiveness of implementation, hydrology and environment. Non-technical criteria have 2 (two) sub-criteria below: economic and social. Each sub-criterion has sub sub-criteria below until there are 27 sub sub-criteria. The most dominant sub-criteria are the geological sub-criteria, which affects up to 32.17%. And the lowest is the economic sub-criteria of 9.45%. The ANP method can be used as a method for prioritizing dams by involving experts as an assessment of the relationships of each criterion, sub-criteria, and sub-criteria. This research also raises a new path, among others, need to examine other criteria outside the observed object such as: politics, culture, or other technical criteria and need to develop model calibration methods and validation.

Keywords: ANP, Dam, Decision making, MCDM, and Multy-criteria.