Development of A Multi-Criteria Decision-Making Model for NPP Location Determination Using The Fuzzy-AHP and Fuzzy-Vikor Methods from The Socio-Economic Aspect

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ABSTRACT

As a country with the fourth largest population in the world, Indonesia must consider building nuclear power plants (NPP) as a renewable energy source. One of the crucial processes in starting it is determining the NPP site. The main objective of this study is to apply two MCDM methods, fuzzy-AHP and fuzzy-VIKOR, to select the best location to build an NPP in terms of socio-economic aspects. Out of ten sub-criteria, the fuzzy-AHP method sorts the most important ones: transmission network (EC1), operating costs (EC2), economic impact (EC3), security (SO1), transportation network (SO2), legal consideration (SO3), impact of tourism (SO4), land ownership (SO5), historical places (SO6), and public acceptance (SO7). Then, Fuzzy-VIKOR uses the order of these criteria for two site choices, East Kalimantan and West Kalimantan, to determine the best site. The results of the weighting of the criteria show that security (SO1), transmission network (EC1), and transportation network (SO2) are the highest priority among the ten criteria that have been analyzed in depth. Applying the algorithm to the two site options determines West Kalimantan as the most suitable location for constructing NPP in Indonesia, with a VIKOR index of 0.3599. From this study, we concluded that fuzzy-AHP and fuzzy-VIKOR can provide excellent results. The results of this study can be used as a decision-making method that is accurate, reliable, and objective.

Kata Kunci: *nuclear power plant, multi-criteria decision-making, fuzzy-AHP, fuzzy-VIKOR*