

UNIVERSITI TEKNOLOGI MARA

TECHNICAL REPORT

**AHP-BORDA COUNT METHOD IN SOLVING MULTI-
CRITERIA DECISION MAKING (MCDM) PROBLEMS
USING DIFFERENT JUDGMENT SCALES IN AHP**

P30S18

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ABSTRACT

Analytical Hierarchy Process (AHP) is one of the popular tools for Multi-Criteria Decision Making (MCDM) and powerful methods for evaluating complex multiple criteria and alternatives involving subjective judgment while Borda Count is a ranking method where voters rank alternatives in accordance their preference. AHP and Borda Count method are separately applied in MCDM, which can manage the decision problems under the existence of multiple criteria. Therefore, this study focuses on AHP-Borda Count method to solve MCDM problems where to select the best method to measure land area. There are two levels of mechanism in AHP-Borda Count method. First level, the weightage of criteria will be evaluated by using the AHP method but with different set of judgment scales. Second, the weightage of alternatives will be calculated by using Borda Count method. In order to demonstrate the application of AHP-Borda Count method with different judgment scales, this study uses real life empirical data about the selection of best method to measure land area. In this study, an interview session with an expert has been done to identify the criteria and alternatives in measuring land area. The chosen criteria to select the best method in measuring land area are cost, technology, accuracy, and accessibility while the alternatives are Lidar, Drone, Total Station, GIS, and GPS. 101 data were collected from respondents through questionnaire. As a result, out of 101 data computed by using linear and root square scale in AHP, only 52 judgments were consistent. As for power scale, only 3 judgments were found consistent. This shows that power scale has the high consistency sensitivity among the linear scale and Root Square scale. This can conclude that power scale is classified as highly sensitive among the three scales, because the percentage of getting consistent judgments is only 2.92%. Linear and root square scale are classified as moderate sensitive as the percentage to obtain consistent judgments are 51.49% for both scales. In term of ranking, for both alternatives and criteria, linear and root square scales has the same rank, while power is differ from the other two. The weightage of criteria for all three scales are significantly different, meanwhile the weightage of alternatives by using AHP-Borda Method with the usage of root square scale is slightly different with the default Saaty's 1-9 linear scale. However, the weightage of power scale is significantly different to be compared with linear and root square scale.