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# Group Decision Making Using Mean SAW Borda and Decision Maker-Based Criteria Weighting

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**Abstract**

In an organization, unfair decisions are often a problem. Therefore, this study creates a group decision-making model to optimize the achievement of fair decisions. This study combines the Mean and Simple Additive Weighting Borda (SAW Borda) methods. The combination of these methods is called Mean SAW Borda. The Mean calculation is used to obtain the average value of decision-makers. The mean value can be the weight of the group decision-making criteria. The weight is the reference for the SAW Borda calculation. This aims to optimize fair decisions. The SAW Borda calculation provides group decisions. This study uses data on the election of a university's head of the Informatics Engineering study program. In the study program, 24 decision-makers gave scores to choose the head of the study program. The Means SAW Borda method calculates the assessment, and the result is that A4 has the highest decision value (1923.26573). The results of the Mean SAW Borda method are the same as those of the conventional election. The conventional method chooses A4 to be the elected candidate. Based on these results, the Mean SAW Borda method can produce fair decisions and is agreed upon by decision-makers.

**Keywords**: group decision making, SAW Borda, Mean, criteria weight, decision maker.

## 1. INTRODUCTION

Decision-making in organizations, especially higher education institutions, often involves various parties. These parties have important roles in organizational group decision-making. The election of the head of a study program is one example of group decision-making in higher education. This position is one of the important positions for determining academic policies. Therefore, the election of the head of a study program must consider aspects of fairness and transparency. Decision-makers often have differences of opinion when attempting to obtain fair decisions. Each forum participant has their assessment of the criteria for selecting the head of a study program.

The head of the study program is elected during a meeting, where participants often engage in debates [1]. Differences of opinion among forum participants

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often give rise to complex debates. The criteria and the assessment of the criteria's weight reflect each participant's opinion [2].

Group decision support systems can enhance objectivity within group discussions [3], [4]. These technique effectively summarize the opinions of decision-makers [5]–[7], and reach group consensus [8]. One of the methods is the Simple Additive Weighting Borda (SAW Borda). The SAW Borda method is a combination of SAW and Borda Count calculations. This method is faster than others [9] and can provide optimal decision results [10]. SAW calculations can make decisions quickly [11]. Then, Borda combined the results [12]. Previous studies have demonstrated that the Borda SAW method is effective in facilitating group decisions. [13], [14]. However, the method cannot run optimally without an agreement on the assessment criteria. The weight of the criteria is one part that must be agreed upon by the decision-makers in the group. Determining the weight of the criteria influences the final decision. Therefore, the weight of the criteria must represent all the opinions of the decision-makers. It aims to ensure that all members can accept the final decision.

In 2022, researchers combined the criteria weights from all decision-makers into a single group weight [15]. However, this technique leads to excessive weight. Therefore, this study aims to address the issue of fairness in group decision-making without combining the weighting of criteria. For this reason, this study does not add up the weights of the decision-makers criteria. But, this study will calculate the average value of the decision-makers' weights. All decision-makers will give a value for the criteria weight. Then, the weight value is obtained by calculating the average of all weights from the decision-makers.

The weighting of the values can be done using the Likert Scale. [16]. Meanwhile, the average calculation can use the Mean method. The average value (mean) can be used to calculate the average of single data. The calculation is the sum of all values divided by the number of variables [17]. This study will use the Mean method to optimize the SAW Borda method when selecting the head of the study program. The Mean method can calculate the average weight value of decision-makers. Then, group decision-making can use the weight to select the head of the study program.

## 2. METHODS

This study creates a group decision-making model. The model uses the Borda SAW method and weights the criteria based on the average value of the decision-makers. Calculating the average value of the decision-makers can make it easier to reach an agreement and can optimize the fairness of the opinions of all decision-makers. To achieve this goal, this study has several stages, which can be seen in Figure 1.

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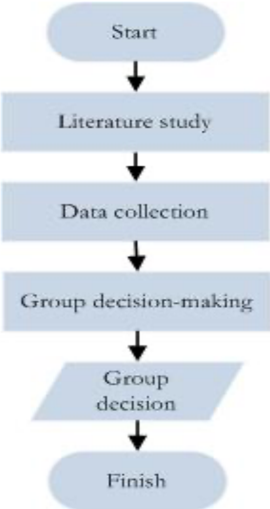


**Figure 1.** Research stages

Figure 1 shows the stages of the research. The first stage of this research is a literature study. Related literature can be a reference for this research. The second stage is a survey and data collection. Then, the third stage uses the data for group decision-making. The result of decision-making is a group decision.

### 2.1. Literature Study

The stages of literature study are understanding related literature. This literature includes research journals, articles, books, and others. This stage can produce the best solutions to solve research problems. This study raises the problem of group decision-making in reaching an fairness.

### 2.2. Data Collection

The data of this study are alternative decision data, criteria data, and value data. Alternative decisions are the names of candidates for study program heads. Criteria data are the criteria for selecting candidates for study program heads. To obtain the criteria, this study uses observation and surveys. The survey technique employs questionnaire assessments to gather responses from participants. The data is sourced from a university located in Ponorogo Regency, East Java, Indonesia, specifically focusing on the election of the head of the study program. Although the university offers 22 study programs, this study concentrates on one in particular: Informatics Engineering. The data consists of three components: alternative data (the names of candidates for the head of the study program), criteria data (the criteria used to select the head), and value data (the scores assigned by decision-makers for each criterion related to each alternative). In 2020, the

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Informatics Engineering program had five candidates for the position of head. A list of these candidates is provided in Table 1.

**Table 1.** Alternative data

| IDAlternative | Name | EmployeeID | Academic Rank |
|---|---|---|---|
| A1 | Candidate1 | XX16-202109-12 | Lektor |
| A2 | Candidate2 | XX24-201609-13 | Lektor |
| A3 | Candidate3 | XX07-201609-13 | Lektor |
| A4 | Candidate4 | XX24-201309-13 | Lektor |
| A5 | Candidate5 | XX28-201804-13 | Asisten Ahli |

Table 1 presents alternative data regarding candidates for the Informatics Engineering study program chair position. In addition to this alternative data, effective decision-making also requires criteria data. At the university, the criteria for selecting the study program chair include work experience in leadership roles (C1), organizational experience (C2), committee experience in academic activities (C3), length of service (C4), academic rank (C5), and lecturer status (C6). This study conducted an assessment survey among all decision-makers. A total of 24 decision-makers provided their assessments for all criteria. Decision makers can assign a value between 1-5 for the criteria weighting. The results of the criteria weight survey are presented in Table 2.

**Table 2.** Criteria weight survey results data

| IDSurvey | C1 | C2 | C3 | C4 | C5 | C6 |
|---|---|---|---|---|---|---|
| P1 | 3 | 2 | 1 | 2 | 3 | 2 |
| P2 | 5 | 4 | 1 | 1 | 1 | 2 |
| P3 | 3 | 4 | 4 | 1 | 5 | 4 |
| P4 | 5 | 3 | 1 | 3 | 4 | 2 |
| … | … | … | … | … | … | … |
| P24 | 2 | 2 | 3 | 2 | 4 | 4 |

Table 2 displays the survey results data on the criteria's weighting. The results of the criteria weighting survey can be used for criteria weighting.

### 2.3. Average Calculation

The average is the result of calculating the mean of several values. This average value represents the central tendency of a data set and is often referred to as the mean. It provides a summary of the data, helping to give an overview of the most common values. Additionally, the average can help draw conclusions about the overall data set. The calculation of the average is performed using Equation 1 [17].

$$Mean\_w_{C_i} = \frac{\sum_{j=1}^{n} w_{C_{i,j}}}{n} \quad (1)$$

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The variable $Mean\_w_{C_i}$ is the average weight of each criterion. The variable $w_{C_i,j}$ is the weight of each criterion of each decision maker. The variable $C_i$ is the i-th criterion. The variable i is the criterion index. The variable *j* is the decision-maker index. The variable n is the total number of decision-makers. In this study, the weighting of the criteria uses the average calculation of the survey results. The average value of the survey results is representative of decision-makers' opinions. These values are expected to optimize group decision-making.

### 2.4. Simple Additive Weighting Borda

The Simple Additive Weighting Borda (SAW Borda) method combines SAW and Borda calculations. The SAW calculation takes decisions individually, and the Borda calculation combines the results of individual decisions for group decisions [18], [19]. The calculation of the SAW Borda method is as follows [20].

1) Making individual decisions using SAW calculations [19], [21].
    a) Determining criteria data:
        - criterion name
        - criterion weight (w)
    b) Normalize data (r). Data normalization utilizes alternative value data against a criterion (x)

$$r_{ij} = \begin{cases} \frac{x_{ij}}{Max(x_{ij})} & \text{if j is benefit criterion} \\ \frac{Min(x_{ij})}{x_{ij}} & \text{if j is cost criterion} \end{cases} \quad (2)$$

    c) Calculating alternative preferences ( $V$ )

$$V_i = \sum_{j=1}^{n} w_j r_{ij} \quad (3)$$

    d) Ranking values $V$ from the largest to the smallest value.

2) Making group decisions with Borda calculations [19], [22], [23].
    a) Giving a borda score to the Alternative. If the Alternative has the highest $V$ value, then the Alternative gets the highest Borda score. The highest borda score is the total number of alternatives. For the Alternative with the second highest $V$ value, the Alternative gets the maximum score minus one, and so on. The lowest borda score (1) will be given to the Alternative with the lowest $V$ value .
    b) Multiplying the borda score by each $V_i$ value
    c) Adding the results of multiplying the borda score by each $V_i$ value

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In this study, group decision-making uses the SAW Borda method. SAW calculations can help each decision maker, and Borda calculations can help reach group decisions, especially those of the head of the Informatics Engineering study program.

### 2.5. The Proposed Method

This study proposes a method to provide fairness in group decision-making, especially in selecting the head of the study program. Fairness can be obtained by calculating the average value of the decision-makers. This study combines the average calculation method (Mean) and SAW Borda. The combination of these methods can be called the Mean SAW Borda method. The process of the Mean SAW Borda method is shown in Figure 2.

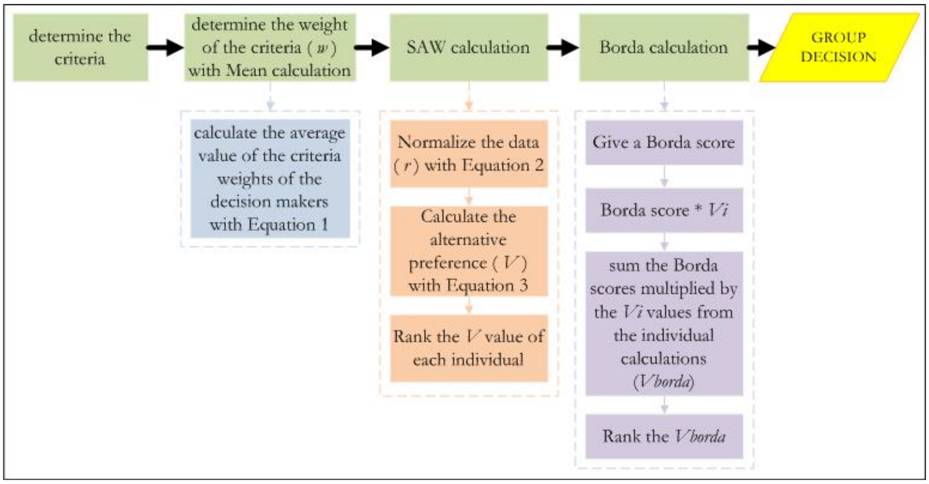


**Figure 2.** The Mean SAW Borda

Figure 2 shows the process of the Mean SAW Borda method. This study uses the Mean SAW Borda method to obtain fair decisions. The decision must represent the opinions of all decision-makers. The first stage is determining the criteria. Then, the weight of the criteria is determined using the Mean calculation to obtain a representative value from the opinions of decision-makers. The SAW calculation uses the weight as a reference for individual decision-making. Then, the Borda calculation combines the results of individual decision-making for group decisions.

## 3. RESULTS AND DISCUSSION

The results and discussion section is divided into two sections: the results section and the discussion section. The results section displays the results of each stage of

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the research, while the discussion section compares this study's results with those of other studies.

### 3.1. Group Decision Making

The results section explains the results of this study. Based on the data obtained, this study first determines the criteria data. The criteria data has a criteria weight. The criteria weight results from the average calculation of the decision maker's assessment of each criterion. The average calculation uses Equation 1. After the average calculation, the criteria data uses that value for the criteria weight. The criteria data can be seen in Table 3.

**Table 3.** Criteria data

| IDCriteria | Criteria Name | Attribute | Weight |
|---|---|---|---|
| C1 | Work experience (Leading and being led) | Benefit | 3.0417 |
| C2 | Organizational experience | Benefit | 2.9583 |
| C3 | Academic activity committee experience | Benefit | 2.9583 |
| C4 | Years of service | Benefit | 2.7917 |
| C5 | Academic rank | Benefit | 2.6667 |
| C6 | Lecturer status | Cost | 3.0833 |

Table 3 presents the criteria data for selecting candidates. For C1 to C5, they have the benefit attribute. The higher the value, the more the alternative will be chosen. Likewise, C6 has the Cost attribute. The lower the value, the more the alternative will be chosen. For C1, C2, and C3, the assessment is based on the decision maker's opinion. The decision maker can give a rating between 1-5. For C4, the assessment is obtained from the length of service in years. For C5, the assessment can use a conversion technique. If the candidate's academic rank is "*Tenaga Pengajar*," the value is 1. If the candidate's academic rank is "*Asisten Ahli*," the value is 2. If the candidate's academic rank is "*Lektor*," the value is 3. If the candidate's academic rank is "*Lektor Kepala*," the value is 4. If the candidate's academic rank is "*Professor*," the value is 5. For C5, the assessment uses the employee status code. The value of the University employee status is 13, while the Foundation is 12. In addition to alternative data and criteria, this study requires valuable data from 24 decision-makers. The value is the value of each criterion for the candidate (alternative data). One of the value data from the participants in the selection of candidates (DM1) can be seen in Table 4.

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**Table 4.** DM1 value data

| IDAlternative | IDCriteria | | | | | |
|---|---|---|---|---|---|---|
| | **C1** | **C2** | **C3** | **C4** | **C5** | **C6** |
| A1 | 5 | 4 | 5 | 3 | 3 | 12 |
| A2 | 4 | 3 | 4 | 8 | 3 | 13 |
| A3 | 4 | 4 | 4 | 8 | 3 | 13 |
| A4 | 5 | 5 | 5 | 11 | 3 | 13 |
| A5 | 5 | 4 | 5 | 6 | 3 | 13 |

Table 4 displays the value data from Decision Maker 1 (DM1). The value data is initially processed using the SAW (Simple Additive Weighting) calculation to obtain individual results. The first step in this process is normalization, which is conducted using Equation 2. The results of the normalization of the value data are presented in Table 5.

**Table 5.** DM1 value data normalization results

| $R_{A,C}$ | C1 | C2 | C3 | C4 | C5 | C6 |
|---|---|---|---|---|---|---|
| **A1** | 1 | 0.8 | 1 | 0.272727 | 1 | 1 |
| **A2** | 0.8 | 0.6 | 0.8 | 0.727273 | 1 | 0.923077 |
| **A3** | 0.8 | 0.8 | 0.8 | 0.727273 | 1 | 0.923077 |
| **A4** | 1 | 1 | 1 | 1 | 1 | 0.923077 |
| **A5** | 1 | 0.8 | 1 | 0.545455 | 0.666667 | 0.923077 |

Table 5 presents the results of the SAW normalization calculation. This data is subsequently used to calculate the alternative preferences $V_i$ for DM1, utilizing Equation 3. The results of these calculations can be found in Table 6.

**Table 6.** Results of calculating alternative preferences on DM1

| IDAlternative | $V_i$ |
|---|---|
| A1 | 14.8780127 |
| A2 | 14.0514103 |
| A3 | 14.6430703 |
| A4 | 17.0128231 |
| A5 | 14.1383085 |

Table 6 presents the results of calculating alternative preferences from DM1. Then, the results are ranked from the largest to the smallest. After ranking, the next stage is to assign a Borda score. The smallest $V_i$ value gets a score of 1, and the score is added 1 for each $V_i$ value. After assigning a Borda score, the $V_i$ value is multiplied by the Borda score. The results of the Borda calculation on DM1 can be seen in Table 7.

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**Table 7.** Determination of score and multiplication of borda score on DM1

| IDDAlternative | $V_i$ | Borda Score | $V_i$ * Borda Score |
|---|---|---|---|
| **A4** | 17.0128231 | 5 | 85.06412 |
| **A1** | 14.8780127 | 4 | 59.51205 |
| **A3** | 14.6430703 | 3 | 43.92921 |
| **A5** | 14.1383085 | 2 | 28.27662 |
| **A2** | 14.0514103 | 1 | 14.05141 |

Table 7 shows the assignment of Borda scores and the multiplication of $V_i$ values with Borda scores. For the data values of DM2 to DM24, the same calculations were also carried out as DM1, including the normalization process, the calculation of individual alternative preferences, the assignment of Borda scores, and the multiplication of $V_i$ values with Borda scores. The results of the multiplication of $V_i$ values with Borda scores for all decision-makers can be seen in Table 8.

**Table 8.** The result of multiplying the borda score by $V_i$

| Decision Maker (DM) | $V_i$ * Borda Score | | | | |
|---|---|---|---|---|---|
| | $V_{A1}$ * Borda Score | $V_{A2}$ * Borda Score | $V_{A3}$ * Borda Score | $V_{A4}$ * Borda Score | $V_{A5}$ * Borda Score |
| DM1 | 59.51205 | 14.05141 | 43.92921 | 85.06412 | 28.27662 |
| DM2 | 13.52593 | 28.10282 | 58.57228 | 82.10582 | 42.41493 |
| DM3 | 28.23518 | 60.34726 | 43.48547 | 82.10582 | 14.06329 |
| DM4 | 59.51205 | 27.80699 | 42.15423 | 82.10582 | 13.66329 |
| DM5 | 44.584 | 28.99031 | 82.09025 | 62.85963 | 13.66329 |
| DM6 | 42.36527 | 27.51116 | 65.6722 | 82.27242 | 13.66329 |
| DM7 | 44.63404 | 13.60767 | 63.30556 | 85.06412 | 28.27662 |
| DM8 | 44.19029 | 14.19933 | 65.6722 | 85.06412 | 29.45994 |
| DM9 | 27.0602 | 13.45975 | 63.30556 | 85.06412 | 40.81491 |
| DM10 | 28.53935 | 12.72018 | 63.30556 | 82.10582 | 44.18991 |
| DM11 | 44.584 | 13.01601 | 79.13195 | 62.85963 | 27.98079 |
| DM12 | 44.584 | 13.01601 | 60.34726 | 78.57454 | 26.50164 |
| DM13 | 44.12774 | 26.03201 | 63.30556 | 82.10582 | 12.80707 |
| DM14 | 40.984 | 12.27643 | 63.30556 | 79.31412 | 24.8433 |
| DM15 | 44.12774 | 13.01601 | 65.6722 | 82.10582 | 27.0933 |
| DM16 | 44.584 | 24.55286 | 60.93892 | 76.35582 | 12.42165 |
| DM17 | 61.87869 | 26.62367 | 45.70419 | 79.14752 | 12.36333 |
| DM18 | 44.584 | 26.62367 | 63.30556 | 79.31412 | 11.74039 |
| DM19 | 46.40902 | 28.39865 | 65.6722 | 85.06412 | 12.58414 |
| DM20 | 42.85906 | 27.80699 | 63.30556 | 82.10582 | 13.47163 |
| DM21 | 42.85906 | 28.10282 | 58.57228 | 82.10582 | 13.60497 |
| DM22 | 42.85906 | 28.10282 | 58.57228 | 82.10582 | 13.60497 |
| DM23 | 44.63404 | 28.10282 | 60.93892 | 79.14752 | 13.60497 |
| DM24 | 46.40902 | 14.05141 | 63.30556 | 79.14752 | 28.39326 |

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Table 8 displays the results of multiplying the $V_i$ value by the Borda score. To unify the decision-making results, the next step is to add up all the results by multiplying $V_i$ by the Borda score of each alternative.

$$V(borda)_{A1} = 59.51205 + 13.52593 + 28.23518 \ldots + 46.40902 = 1027.64177$$
$$V(borda)_{A2} = 14.05141 + 28.10482 + 60.34726 \ldots + 14.05141 = 550.519044$$
$$V(borda)_{A3} = 43.92921 + 58.57228 + 43.48547 \ldots + 63.30556 = 1463.57055$$
$$V(borda)_{A4} = 85.06412 + 82.10582 + 82.10582 \ldots + 79.14752 = 1923.26573$$
$$V(borda)_{A5} = 28.27662 + 42.41493 + 14.06329 \ldots + 28.39326 = 519.501469$$

After adding up the V(borda) values of each alternative, the next step is ranking based on the sum of the V(borda) values of each alternative. The highest V(borda) value gets Rank 1, and so on. The complete results can be seen in Table 9.

**Table 9.** Final result of borda calculation

| IDAlternative | $V(borda)$ | Rank |
|---|---|---|
| A4 | 1923.26573 | 1 |
| A3 | 1463.57055 | 2 |
| A1 | 1027.64177 | 3 |
| A2 | 550.519044 | 4 |
| A5 | 519.501469 | 5 |

Based on Table 9, Candidate 4 (A4) is chosen as the head of the Informatics Engineering study program. The value of $V(borda)_{A4}$ is 1923.26573. This value is the highest compared to others.

For conventional techniques, selecting the head of the study program uses the voting and deliberation methods. The conventional technique selects Candidate4 to head the study program. A comparison of the results of the Mean SAW Borda method with the results of the conventional method can be seen in Table 10.

**Table 10.** Comparison of the results of the Mean SAW Borda method and the conventional method

| Id_Alternative | Name | Rank | |
|---|---|---|---|
| | | Mean SAW Borda | Conventional |
| A1 | Candidate1 | 3 | 3 |
| A2 | Candidate2 | 4 | 5 |
| A3 | Candidate3 | 2 | 2 |
| A4 | Candidate4 | 1 | 1 |
| A5 | Candidate5 | 5 | 4 |

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Table 10 compares the results of the Mean SAW Borda method and the results of conventional methods. The Mean SAW Borda method selects Candidate4 to become the head of the study program (Rank 1), while the conventional method also selects Candidate 4. Based on these results, the Mean SAW Borda method can

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run well and support decisions for selecting the head of the study program because its results are the same as those of the conventional method.

### 3.2. Discussion

This study demonstrates that the Mean SAW Borda method effectively facilitates objective and fair group decision-making, as evidenced by the research results. The Mean SAW Borda method aligns closely with conventional decision-making techniques, such as voting and deliberation, yet it significantly enhances efficiency and objectivity. Traditional methods often rely on voting outcomes that can lead to ties, requiring prolonged deliberations to break deadlocks—introducing subjectivity and potential bias into the process. Furthermore, deliberations can be time-consuming and may not adequately represent the collective opinion of all decision-makers.

The Mean SAW Borda method addresses these limitations by systematically aggregating the preferences of decision-makers, ensuring every participant's assessment is equally considered. By calculating the average weight of each decision criterion and incorporating normalized preference scores with Borda ranking, the method produces decision outcomes that are both fair and representative of the group's overall judgment. This approach eliminates the need for subjective discussions to resolve ties and accelerates the decision-making process.

A key strength of this method is its optimization of fairness, which stems from equalizing the influence of each decision-maker through averaging. Every criterion's weight is derived from the mean of all evaluators' assessments, minimizing the dominance of any single decision-maker's opinion. Consequently, the final decision reflects a balanced consensus rather than the influence of a vocal minority or majority. This fairness is particularly evident in the consistent selection of Candidate 4 (A4) as the top candidate across both the Mean SAW Borda method and the conventional method, reinforcing the method's validity.

Table 11 offers a comparative overview of this study's results against previous research. Prior studies using methods like Vikor Borda, Profile Matching Borda, and various implementations of Simple Additive Weighting (SAW) Borda or Analytical Hierarchy Process (AHP) Borda did not resolve fairness concerns among decision-makers. In contrast, this study's Mean SAW Borda method successfully optimizes fairness and objectivity, marking a notable advancement in group decision-making methodologies.

**Table 11.** Comparison of research results with previous research

| Method | Optimization | Resolving issues of fairness from decision makers |
|---|---|---|
| Vikor Borda [24] | - | No |

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| Method | Optimization | Resolving issues of fairness from decision makers |
|---|---|---|
| Profile Matching Borda [25] | - | No |
| Simple Additive Weighting Borda [13] | - | No |
| Simple Additive Weighting Borda [14] | - | No |
| Analytical Hierarchy Process Borda [26] | - | No |
| Mean Simple Additive Weighting Borda (This study) | Mean Method | Yes |

The results summarized in Table 11 clearly show that previous research methods did not address fairness issues inherent in group decision-making. This study's Mean SAW Borda method successfully ensures equitable decision-making by normalizing individual preferences and averaging scores across all decision-makers. This approach effectively mitigates biases that can occur when some individuals have a disproportionate influence over the final outcome.

Moreover, the alignment of the Mean SAW Borda method's results with those of conventional methods both selecting Candidate 4 as the most suitable head of the study program confirms the accuracy and reliability of the proposed method. Unlike conventional approaches, however, the Mean SAW Borda method requires no lengthy discussions or subjective compromises, instead offering a mathematically grounded decision based on collective evaluations.

Ultimately, the Mean SAW Borda method stands out as a robust, objective, and efficient alternative for group decision-making, particularly in contexts requiring fair representation of diverse opinions. By leveraging quantitative techniques to balance decision-makers' inputs, the method ensures transparent, reproducible, and equitable outcomes that support effective organizational governance.

## 4. CONCLUSION

The Mean SAW Borda method can help make group decisions based on the results and discussion. In a case study of the election of the head of the Informatics Engineering Study Program at a University, the Mean SAW Borda method produced A4 (Candidate4) to become the head of the study program. The final score of A4 has the highest value ($V(borda) = 1923.26573$). Conventional selection also produced Candidate4 to become the head of the study program. This proves that the Mean SAW Borda method can help elect the head of the study program. In addition, the results of Mean SAW Borda can also solve the problem of injustice in group forums. For further research, the Mean SAW Borda method

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can be used to solve other group problems. In addition, the development of group decision-making methods can be further optimized.

## REFERENCES

[1] F. K. Pardosi and N. A. Hasibuan, "Sistem Pendukung Keputusan Pemilihan Calon Ketua Program Studi Menerapkan Metode VIKOR," *Build. Informatics, Technol. Sci.*, vol. 3, no. 2, pp. 64–70, 2021, doi: 10.47065/bits.v3i2.305.

[2] J. A. M. Molinera, F. J. Cabrerizo, J. Mezei, C. Carlsson, and E. Herrera-Viedma, "A dynamic group decision making process for high number of alternatives using hesitant Fuzzy Ontologies and sentiment analysis," *Knowledge-Based Syst.*, vol. 195, p. 105657, 2020, doi: 10.1016/j.knosys.2020.105657.

[3] H. Santoso, W. Widodo, and R. Swastyani, "Sistem Pendukung Keputusan Kelompok Pemilihan Pegawai Terbaik dengan Metode AHP , Oreste dan Borda," *J. FASILKOM*, vol. 14, no. 3, pp. 681–687, 2024.

[4] S. Liu, F. T. S. Chan, and W. Ran, "Decision making for the selection of cloud vendor: An improved approach under group decision-making with integrated weights and objective/subjective attributes," *Expert Syst. Appl.*, vol. 55, pp. 37–47, 2016, doi: 10.1016/j.eswa.2016.01.059.

[5] M. Tavana, S. M. H. Mousavi, H. Mina, and F. Salehian, "A dynamic decision support system for evaluating peer-to-peer rental accommodations in the sharing economy," *Int. J. Hosp. Manag.*, vol. 91, no. March, p. 102653, 2020, doi: 10.1016/j.ijhm.2020.102653.

[6] B. Alavi, M. Tavana, and H. Mina, "A Dynamic Decision Support System for Sustainable Supplier Selection in Circular Economy," *Sustain. Prod. Consum.*, vol. 27, pp. 905–920, 2021, doi: 10.1016/j.spc.2021.02.015.

[7] Y. Primadasa and Alfiarini, "Sistem Pendukung Keputusan Penilaian Kinerja Karyawan Menggunakan Pembobotan Ahp Dan Moora," *Cogito Smart J.*, vol. 5, no. 2, pp. 159–170, 2019.

[8] A. C. Marques *et al.*, "Support for multicriteria group decision with voting procedures: Selection of electricity generation technologies," *Clean. Environ. Syst.*, vol. 3, no. October, p. 100060, 2021, doi: 10.1016/j.cesys.2021.100060.

[9] R. P. Sari, Istikoma, and F. Supriadi, "The Comparison of SAW BORDA and TOPSIS BORDA Methods In the Zakat Recipient Determination System Education programs ( Case Study : BAZNAS , West Kalimantan Province )," 2019, doi: 10.4108/eai.11-12-2019.2290862.

[10] T. F. A. Aziz, S. Sulistiyono, H. Harsiti, A. Setyawan, A. Suhendar, and T. A. Munandar, "Group decision support system for employee performance evaluation using combined simple additive weighting and Borda," in *IOP Conference Series: Materials Science and Engineering*, 2020, vol. 830, no. 3, pp. 1–9, doi: 10.1088/1757-899X/830/3/032014.

p-ISSN: **2656-5935** http://journal-isi.org/index.php/isi e-ISSN: **2656-4882**

[11] P. Utomo and D. N. Amadi, "Pemilihan Tanaman Pangan Untuk Ketahanan Pangan Masa Pandemi Dengan Simple Additive Weighting Di Kabupaten Madiun," *Fountain Informatics J.*, vol. 5, no. 3, p. 12, 2020, doi: 10.21111/fij.v5i3.4924.
[12] Y. Sonatha, M. Azmi, and I. Rahmayuni, "Group Decision Support System Using AHP, Topsis and Borda Methods for Loan Determination in Cooperatives," *Int. J. Informatics Vis.*, vol. 5, no. 4, pp. 372–379, 2021, doi: 10.30630/JOIV.5.4.640.
[13] F. Fitriyani, B. Adiwinoto, E. Helmud, A. A. Alkodri, and A. Anisah, "GDSS Penilaian Kinerja Pada ISB Atma Luhur Menggunakan Metode SAW dan Borda," *J. Sisfokom (Sistem Inf. dan Komputer)*, vol. 11, no. 1, pp. 136–141, 2022, doi: 10.32736/sisfokom.v11i1.1382.
[14] Fitriyani and D. Irawan, "Gdss Pemilihan Karyawan Berprestasi Pada Smk Kesehatan Mutiara Mandiri Sungailiat Menggunakan Metode Saw Dan Borda," *J. Teknol. Inf. Mura*, vol. 14, no. 2, pp. 79–90, 2022, doi: 10.32767/jti.v14i2.1831.
[15] C. Z. Radulescu, M. Radulescu, and R. Boncea, "A Hybrid Group Weighting Method based on the Borda and the Group Best Worst Method with application for digital development indicators," in *Procedia Computer Science*, 2022, vol. 214, pp. 10–17, doi: 10.1016/j.procs.2022.11.142.
[16] P. Utomo, A. Budiman, and D. N. Amadi, "Optimasi Metode Simple Additive Weighting Menggunakan Skala Likert dalam Aplikasi Pemilihan Peserta Rapat Bersih Dusun," *J. Comput. Inf. Syst. Ampera*, vol. 4, no. 3, pp. 141–156, 2023.
[17] S. F. Fitria, E. Harahap, F. Badruzzaman, Y. Fajar, and D. Darmawan, "Aplikasi Rata-Rata Data Tunggal," in *Seminar Nasional Pendidikan Matematika Ahmad Dahlan 2018*, 2018, pp. 145–150.
[18] T. F. A. Aziz, S. Sulistiyono, H. Harsiti, A. Setyawan, A. Suhendar, and T. A. Munandar, "Group decision support system for employee performance evaluation using combined simple additive weighting and Borda," in *IOP Conf. Series: Materials Science and Engineering*, 2020, pp. 1–9, doi: 10.1088/1757-899X/830/3/032014.
[19] D. Meidelfi, Yulherniwati, F. Sukma, D. Chandra, and A. H. Soleliza Jones, "The implementation of SAW and BORDA method to determine the eligibility of students' final project topic," *Int. J. Informatics Vis.*, vol. 5, no. 2, pp. 144–149, 2021, doi: 10.30630/joiv.5.1.447.
[20] P. Utomo, "Pengembangan Model Pengambilan Keputusan Kelompok Secara Multi Level dengan Kriteria Dinamis dan Metode Fuzzy Learning Vector Quantization," Universitas Diponegoro, 2024.
[21] D. Nofriansyah and S. Defit, *Multi Criteria Decision Making (MCDM) pada Sistem Pendukung Keputusan*. Yogyakarta: Deepublish, 2020.
[22] D. Lippman, *Math in Society*. 2017.

p-ISSN: **2656-5935** http://journal-isi.org/index.php/isi e-ISSN: **2656-4882**

[23] Y. Windriono, R. K. Dewi, and L. Fanani, "Pengembangan Aplikasi Rekomendasi Kolam Renang menggunakan Metode Topsis Borda," *J. Pengemb. Teknol. Inf. dan Ilmu Komput.*, vol. 5, no. 8, pp. 3332–3338, 2021.

[24] Nurjannah and D. P. Utomo, "Sistem Pendukung Keputusan Penyeleksian Colour Guard Pada Marching Band Ginada Dengan Menggunakan Metode Vikor Dan Borda," *JUKI J. Komput. dan Inform.*, vol. 2, no. 1, pp. 35–48, 2020.

[25] P. Sugiartawan, N. N. D. Ardriani, and I. M. W. Kusuma, "Sistem Pendukung Keputusan Kelompok Promosi Jabatan Menggunakan Metode Profile Matching," *J. Sist. Inf. dan Komput. Terap. Indones.*, vol. 3, no. 4, pp. 36–47, 2021, doi: 10.22146/jsikti.

[26] Fitriyani and Y. Andrika, "Analisis Penerapan Metode Ahp Dan Borda Untuk Kawasan KPHP ( Kesatuan Pengelolaan Hutan Produksi ) Sungai Sembulan Bangka Tengah," vol. 6, no. 1, pp. 36–42, 2024.