Application of the Preference Selection Index (PSI) Method in the Decision Support System for Selecting Prospective OSIS Chairpersons at SMAN 1 Mandrehe

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Abstract

The process of selecting the OSIS president begins with the selection of candidates by the OSIS advisor; at SMAN 1 Mandrehe, this process is still done manually and is prone to subjectivity. Previous decision support system (DSS) research used methods such as SAW, AHP, TOPSIS, WASPAS, and MAUT. All these methods rely on the decision-maker's criterion values. This applied research uses the Preference Selection Index (PSI) method, which evaluates the criteria values based on data variations in the decision support system (DSS) that selects the OSIS chairperson candidates. PSI has five criteria: report card grades, attendance percentage, organisational experience, leadership, communication, and vision-mission. The system was developed as a web-based application using the waterfall model and tested through user acceptance testing, black-box testing, and calculation accuracy testing. The calculations performed on fifteen potential candidates resulted in a valid weighting, with attendance percentage as the most important criterion (0.2487) and work experience as the least important criterion (0.0366). With an index of 0.9768, alternative A11 ranked first. Additionally, this study found that the attendance criterion in the form of costs produces a negative weight, so the condition $\Phi j > 0$ is required for every calculation. The test results show that this system can assist OSIS advisors in selecting candidates fairly and transparently, without using student voting as a substitute.

Keywords: *Decision Support System, Preference Selection Index, Objective Weighting, Ttudent Council President, Candidate Selection*

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Introduction

National education aims not only to acquire academic abilities but also to shape students into moral, healthy, knowledgeable, intelligent, innovative, independent individuals, and responsible democratic citizens [1]. The Student Council (OSIS) is the only student organization at the school level authorised by the government to implement systematic and sustainable student development policies to achieve these goals. In its position, OSIS serves as the main place for students to learn how to organise, become leaders, and participate in society.

The success of the student council in implementing its work programs greatly depends on the quality of its chairperson. The OSIS Chairperson not only organises the administrators and leads meetings but also serves as a liaison between students and the school and sets an example for other students. On the other hand, the election of the OSIS Chairman teaches students political education by teaching them to participate in the democratic process in a fair, honest, and responsible manner [2]. Schools usually screen candidates before the voting begins to ensure that the candidates who advance meet the eligibility criteria. This screening process is very important because if not done correctly, students will be given a choice only among less competent candidates, which will reduce the quality of the democratic process in the next stage.

Studies show that the screening phase for OSIS chairperson candidates is usually conducted subjectively. [3], the determination of the OSIS chairperson and vice-chairperson candidates is often done without considering all the requirements and supporting elements of the candidates. [4] found that the OSIS advisors had to engage in lengthy discussions to select candidates due to the lack of student interest in running for the position. As a result, the selection outcomes tend to be subjective and unfair. The manual selection process takes a long time, causes calculation errors, and is less efficient in data processing, according to other studies [5], [6].

At SMA Negeri 1 Mandrehe, Nias Barat Regency, there is also a similar problem. At this school, the selection of the OSIS chairperson is still done manually or through a deliberation of the teaching staff based on previous observations and interviews with the students. The criteria used by the school include report card grades, discipline, organisational activity, attitude, and communication skills. There are 15 students who applied as candidates for the 2025–2026 period, but only one was designated as a candidate. This raises several issues, such as the absence of written assessment standards, discrepancies in evaluations among teachers, objections from students who did not pass, or the long time taken to determine the candidates. If this situation continues, the school's decision to select the OSIS chairperson candidate may be questioned objectively and accountably.

Decision Support System (DSS) is a computer-based system that assists decision-makers by using models and data to solve semi-structured problems [7]. Various Multi-Criteria Decision Making (MCDM) methods have been used in the selection of the Student Council President. These methods include the Analytical Hierarchy Process (AHP), Simple Additive Weighting (SAW) [5], [6], Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) [4], Weighted Aggregated Sum Product Assessment (WASPAS) [8], and Multi-Attribute Utility Theory (MAUT). In general, research shows that Decision Support Systems (DSS) can accelerate the selection process and produce a more organised and clear ranking of candidates.

However, the analysis of the research shows one common limitation: each method used indicates that the criteria set by the decision-makers are very important. While AHP uses a pairwise comparison matrix based on expert subjective assessments, SAW, TOPSIS, and WASPAS use direct school assessments. As a result, the weighting stage is merely the stage where subjectivity will be eliminated from the selection process. Methodologically, differences of opinion among decision-makers on how to assign weights can lead to different rankings of candidates. This reduces trust in the ranking results as objective, especially when selecting student leaders who demand fairness and accountability.

Created the Preference Selection Index (PSI), which is one of the methods that can overcome this limitation. PSI has the main advantage of solving MCDM problems without requiring the relative importance of criteria to be established. Through the application of simple statistical concepts, the weight of each criterion is objectively calculated from the variation in preference values of alternative data. This is different from how decision-makers determine the weight of each criterion. [9] tested PSI on various decision-making problems found in the literature. They found that their rankings were consistent with previous research findings, which means that PSI is considered accurate and can be used in various situations.

PSI has been used to select raw material supplier employees, tutoring instructors, and research grant recipients for lecturers [10], [11]. PSI has also been used in schools to select participants for student exchange programs and to suggest extracurricular activities [11], [12] state that the results of PSI can be used as a comparison against human evaluator assessments to maintain the quality and objectivity of the evaluation because researchers do not need to set criterion weights. The results show that PSI can be applied to the selection of candidates that require objectivity, such as the selection of OSIS chairperson candidates.

Nevertheless, according to research conducted on the OpenAlex database, Garuda, and academic search engines, there has been no study applying the PSI method to the decision support system for selecting the OSIS chairperson. Previous research on the same subject is still dominated by methods relying on subjective weighting, and the use of PSI in school environments is still limited to the selection of students for academic programs and extracurricular activities. The novelty of this research comes from this gap. By using PSI, it is hoped that recommendations for the prospective Chairperson of the Student Council at SMAN 1 Mandrehe will be made that are objective, transparent, and accountable. This is because the weight of the criteria is based on candidate data. To maintain democracy in the election of the student council president, the advisor must consider the results of this system when selecting candidates, rather than replacing the student vote.

Literature Review

1. Previous Research

To determine the position and novelty of this research, a review of previous studies was conducted. This review includes the methods that have been used, the criteria considered, and the results achieved. Academic search engines, OpenAlex, Crossref, and Garuda were used to search for keywords such as "decision support system," "student council president," and "preference selection index." The search results are divided into two groups: one is SPK research on the case of the OSIS chairman election, and the other is research applying the PSI method.

2. Research on the Application of the Preference Selection Index Method

Were the first to use the PSI method to solve material selection problems; this method does not require the establishment of relative importance among criteria to determine superiority. [9] then examined this method in five decision-making cases at the design stage of the production system life cycle. They compared the results with previous research; the results showed that PSI is accurate and widely used.

PSI is widely used in Indonesia for personnel selection issues. [11] used PSI to select internal research grant proposals from lecturers with nine options and five criteria. They stated that the results of PSI can be used as a comparison for reviewer assessments because the weight of the criteria does not need to be established. PSI was used [13] to select the best tellers based on attitude, skills, and appearance. On the other hand, [10] used it to select tutoring teachers based on experience, consistency, creativity, and communication skills. [14] used PSI to select raw material supplier employees and demonstrated that this method can provide an effective assessment for employee selection.

[12] used PSI to select students for the student exchange program at the school. They used criteria such as TOEFL scores, report cards, interviews, knowledge of cultural arts, and written tests. [15] used PSI to recommend extracurricular activities based on interests, talents, achievements, and parental permission. They argue that PSI can generate criterion weights objectively without setting initial subjective weights. Table 1. shows a summary of the PSI study.

Table 1. Previous Research on the Application of the PSI Method

No	Researcher (Year)	Decision Object	Criteria	Main Findings
1	Maniya & Bhatt (2010)	Material selection	Properties of materials	Introducing PSI; does not require relative weights between criteria
2	Attri & Grover (2015)	Decision on the design phase of the production system	Varied, from five cases in the literature	PSI results are in line with previous researchers; the method is considered accurate.
3	Sundari et al. (2019)	Selection of faculty research grant proposals	Problem formulation, external opportunities, methods, literature review, feasibility	The PSI results can serve as a comparison for the reviewers' assessments.
4	Rizanti et al. (2019)	Selection of exchange students	TOEFL scores, report cards, interviews, cultural arts, written tests	PSI can be applied to select the best students.
5	Rizki & Ginting (2020)	Selection of the best teller	Attitude, skills, appearance	The determination process is faster and more effective.
6	Fauziyah et al. (2022)	Selection of tutoring instructors	Experience, consistent, creative, communicative	The best alternative received a score of 0.9196.
7	Amrullah et al. (2025)	Selection of raw material supplier staff	Staff performance criteria	PSI is effective for evaluation in staff selection.
8	Tanjung et al. (2026)	Extracurricular recommendations	Interest, talent, achievement, parental permission	Objective weights without initial weight assignment

3. Synthesis and Research Position

Tables 2. and 2. show three important results. First, the SPK research for the selection of the OSIS chairman is evaluated as a whole using methods that assess decision-making criteria directly (SAW, TOPSIS, WASPAS, and MAUT) and through pairwise comparison (AHP). Therefore, subjectivity has not been completely eliminated; instead, it has been transferred to the weighting stage. Second, it has been proven that PSI can be applied to various student and personnel selection issues; its main advantage is the criteria weights calculated objectively from data. Third, there has been no research applying PSI to the selection of prospective student council presidents, and most previous studies on student council presidents have been conducted at the junior high school and vocational school levels.

As a result, this research falls between the two groups of studies: the application of the PSI method, which has proven to be objective in previous research cases, to the selection of the OSIS chairperson candidates at SMAN 1 Mandrehe, which is a secondary school. This research is newer because the weight of the criteria is calculated from the candidates' own data, so the screening results do not depend on the subjective preferences of the supervisor in calculating the weight.

4. Intra-School Student Organization (OSIS)

The Student Council (OSIS) is the official student organization in secondary schools. The National Minister of Education Regulation Number 39 of 2008 on Student Development stipulates that the Student Council (OSIS) is the only student organization allowed in schools and that development is carried out through extracurricular and co-curricular activities (National Ministry of Education, 2008). The goal of student development is to maximise students' potential by utilising their talents, interests, and creativity. This is in line with the national education goals to build democratic and responsible citizens (Republic of Indonesia, 2003).

OSIS has an organisational structure. The organization is led by a chairperson, assisted by a vice-chairperson, secretary, treasurer, and field coordinators, under the guidance of a supervising teacher. The position of the chairperson is very strategic because they are responsible for organising work programs, representing students in their relations with the school, and serving as a role model for other students.

5. Candidatos y Presidente de la Elección del Consejo Estudiantil

The election of the Student Council President is an annual event that teaches politics and fills positions in the organization. Students learn to exercise their right to vote, understand the campaign process, and accept the results of democratic elections through this activity [2]. The election of the OSIS President is usually conducted in the following stages. a. Registration of candidates initiated by students or proposed by the class advisor; b. Selection of candidates based on certain criteria by the OSIS advisor or a team appointed by the school; c. Determination of candidates who pass the selection, who then present their vision, mission, and campaign; and d. Voting by all students and the appointment of the elected OSIS president.

6. Decision Support System

Decision Support System (DSS) is a computer-based information system intended to assist decision-makers in solving semi-structured problems using models and data [7]. DSS is not intended to replace decision-makers; rather, the goal of DSS is to enhance the decision-making process by providing structured and measurable information.

According to [7], the decision-making process of DSS follows Simon's steps: intelligence (identifying the problem), design (creating models and alternatives), choice (selecting the best alternative), and implementation. This research conducted the knowledge stage through observation and interviews at SMAN 1 Mandrehe. The design stage involves setting criteria and the PSI model, the selection stage involves ranking the candidates to be chosen, and the implementation stage involves applying the system in the school.

7. Multi-Attribute Decision Making (MADM)

Multi-Attribute Decision Making (MADM) adalah pendekatan pengambilan keputusan yang berfokus pada beberapa atribut atau kriteria untuk memilih pilihan terbaik dari sejumlah pilihan yang terbatas. Nilai setiap alternatif terhadap setiap kriteria dimasukkan ke dalam matriks keputusan yang menunjukkan masalah MADM. Kriteria MADM terdiri dari dua jenis: kriteria keuntungan (semakin besar nilainya, misalnya nilai rapor) dan kriteria biaya (semakin kecil nilainya, misalnya jumlah pelanggaran tata tertib).

The weight of the MADM criteria is an important component. Based on its source, weighting can be divided into objective weighting, which comes from alternative data, and subjective weighting, which comes from the judgement of decision-makers. In previous research on the OSIS Chairperson, the SAW, TOPSIS, WASPAS, and AHP methods were used. On the other hand, PSI assesses data variation objectively.

8. Metode Preference Selection Index (PSI)

The Preference Selection Index (PSI) method was developed to solve MADM problems. A distinctive feature of this method is that it does not require the decision-maker to establish the relative importance between criteria. The weight of each criterion is calculated using a statistical concept, namely the magnitude of the variation in preference values for that criterion. This method is appropriate to use when there are differing opinions in determining the relative importance among criteria. The steps of the PSI method are as follows.

Developing a decision matrix. The decision matrix X is m × n, where m is the number of options (candidates) and n is the number of criteria.

$X = [x_{ij}]_{m \times n}, \quad i = 1, 2, \ldots, m; \; j = 1, 2, \ldots, n$

with xij as the alternative value for the i-th alternative on the j-th criterion.

Normalisasi matriks keputusan. Untuk kriteria *benefit* digunakan sedangkan untuk kriteria *cost*.

$N_{ij} = x_{ij} / x_j^{max}$

$N_{ij} = x_j^{min} / x_{ij}$

Calculating the average normalised performance value for each criterion.

$\bar{N}_j = (1/m) \times \Sigma_{i=1}^{m} N_{ij}$

Calculating the preference variation value for each criterion.

$PV_j = \Sigma_{i=1}^{m} (N_{ij} - \bar{N}_j)^2$

Calculating the deviation of preference values for each criterion.

$\Phi_j = 1 - PV_j$

determining the overall preference value, also known as the overall preference value, which serves as a measure for the criteria.

$\psi_j = \Phi_j / \Sigma_{j=1}^{n} \Phi_j$

Calculating the preference selection index for each alternative.

$I_i = \Sigma_{j=1}^{n} (N_{ij} \times \psi_j)$

The PSI method has many benefits. First, the weight of the criteria is calculated from the data, reducing the influence of the decision-maker's subjectivity. Second, the calculation is simple and can be used in computer programs. Finally, the results are accurately evaluated when compared to different approaches [9]. However, PSI also has limitations. Criteria with smaller value variations will have a larger Φj value, thus having a greater weight. Additionally, school policies that consider certain criteria more important are excluded because the weight is entirely determined by the data. Therefore, as a form of validation, the PSI results from this study will be compared with the assessment of the OSIS advisor.

Research Methodology

1. Framework of Thought

The framework of thought shows a logical flow of research, starting from the problem, the theory underlying the problem, the solution to the problem, and the expected results.

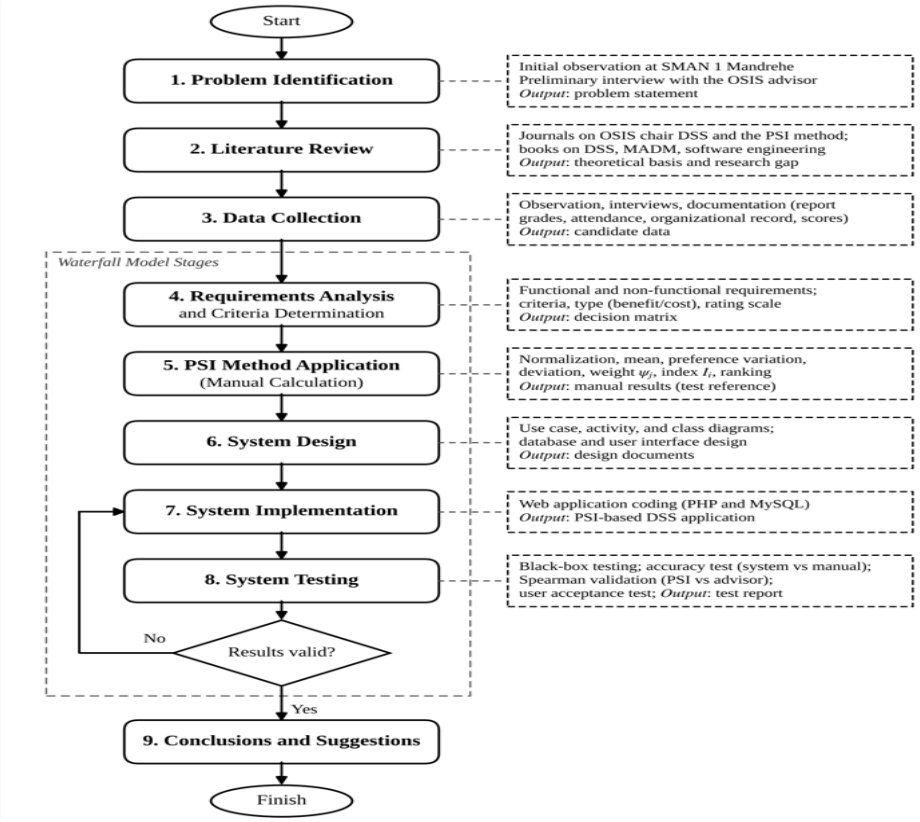


Figure 1. Research Conceptual Framework

The research structure, comprising nine consecutive steps, is shown in Figure 1. In order to create the problem statement, the research starts with problem identification by early observation at SMAN 1 Mandrehe and an initial interview with the OSIS adviser. In order to create the theoretical foundation and pinpoint the research gap, a literature review of journals on decision support systems (DSS) for OSIS chair selection and the Preference Selection Index (PSI) technique, as well as books on DSS, MADM, and software engineering, comes next. After that, information on candidates is gathered by observation, interviews, and documentation. This includes information about report grades, attendance, organisational records, and selection scores.

The waterfall model is used in stages four through eight. Requirements analysis and criterion determination, which result in the decision matrix, are the first steps in this process. After that, the data are manually processed using the PSI technique, which includes normalisation, mean computation, preference variation and deviation, and the derivation of criterion weights ψ_j and the ranking index I_i. The test reference is these manual results. The system is then developed as a web application using PHP and MySQL, utilising use case, activity, and class diagrams in addition to database and user interface designs. Black-box testing, an accuracy test that compares system output with human computation, a Spearman validation test that compares the PSI rating with the advisor's ranking, and a user acceptability test are all included in the testing. The procedure goes back to the implementation stage for adjustment if the results are not legitimate; if they are, the study moves on to the conclusions and recommendations.

2. Criteria and Research Data

The selection criteria are formulated based on previous research studies Table 2 and will be confirmed with the SMAN 1 Mandrehe party during the needs analysis stage. The preliminary design of the criteria is presented in Table 3. Unlike the SAW, AHP, or TOPSIS

methods, this study does not set the criteria weights at the beginning, as the weights will be objectively calculated by the PSI method based on candidate data.

Table 2. Draft Criteria for Selecting Prospective Student Council President Candidates

Code	Criteria	Type	Rating Scale	Data source
C1	Average grade on report card	Benefit	Numbers 0–100	Latest semester report card
C2	Attendance percentage	Benefit	Percentage (0–100)	Homeroom teacher's attendance summary
C3	Organizational experience	Benefit	Scale 1–5 (Table 3.2)	Organizational history / certificates
C4	Leadership	Benefit	Score 0–100	Interview by the selection team
C5	Communication as well as vision and mission	Benefit	Scor 0–100	Presentation before the selection committee

Table 3. Conversion of Organisational Experience Criteria Value (C3)

Value	Explanation
1	Has never participated in an organization or extracurricular activity.
2	Members of an organization or extracurricular activity
3	Members of two or more organisations or extracurricular activities
4	Core management (chairperson, secretary, or treasurer) in an organization
5	Core management in two or more organisations, or has ever been the head of an organization.

The attendance criterion (C2) is stated as a percentage of attendance, thus classified as a benefit type. The value is calculated from the attendance recap using the following formula.
$C2 = ((HE - TK) / HE) \times 100\%$.
with HE being the number of effective semester days and TK being the number of unexcused absences. Attendance is not stated as the number of days absent (cost criterion), because in the trial with simulation data of 15 prospective candidates, cost normalisation resulted in a preference variation value of more than 1. As a result, the deviation Φj is negative and the criterion weight becomes negative. Therefore, each PSI calculation in this study is checked with the condition $\Phi j > 0$ for all criteria.

Results

1. Analysis of MOORA Method Calculations

This study presents the results of the analysis of the Preference Selection Index (PSI) method with respect to 15 bakal calon Ketua OSIS. Delapan langkah dan perhitungan. Every angka is analysed using penuh ketelitian and presented in eight desimal angka. This perhitungan's results also serve as a basis for evaluating the system's ketepatan.

Table 4. presents data for 15 prospective candidates (A1–A15) based on two criteria. The attendance criterion is still defined as the number of unexcused absences, with an effective semester of around 100 days.

Table 4. Initial Data of Prospective OSIS Chairperson Candidates (Simulation Data)

Alternatve	C1 Report Card	Absent (days)	C3 Organization	C4 Leadership	C5 Communication
A1	86	2	4	85	82
A2	88	0	3	80	88
A3	90	3	5	78	80
A4	82	1	2	90	85
A5	85	4	3	75	78
A6	79	0	4	88	86
A7	91	2	2	72	75
A8	84	5	5	86	90
A9	87	1	3	82	79
A10	80	3	1	70	72
A11	89	0	4	91	87
A12	83	6	2	77	81
A13	92	2	3	84	76
A14	81	1	5	79	84
A15	85	3	4	83	83

2. Attendance Criteria Eligibility Check

Before the main calculation, the researchers conducted a trial using attendance as the cost criterion, which is the number of days a person is absent. Because there are candidates with a value of zero, the data was modified by adding 1 to prevent cost normalisation from dividing by zero. Table 5 shows the test results.

Table 5. Results of Attendance Trials as a Cost Criterion

Komponen	C1	C2 (cost)	C3	C4	C5
PV_j	0,0269	1,3129	0,8533	0,0666	0,0455
Φ_j	0,9731	−0,3129	0,1467	0,9334	0,9545
ψ_j	0,3611	−0,1161	0,0544	0,3464	0,3542

The variation value of preference C2 reached 1.3129, exceeding 1, resulting in a deviation of Φ2 = -0.3129 and a weight of Φ2 = -0.1161, which are negative values, as shown in Table 5. Because candidates who are more frequently absent will receive a higher score, a negative weight is not logically acceptable. This issue arises because the normalisation of costs with the min/x ratio is very steep for small count data. One day of absence has reduced the normalised value from 1.0000 to 0.5000.

The attendance criterion (C2) is operationalised as a profit-type attendance percentage based on the findings, according to Equation (3.1). For example, A1, who was absent for two days, has an attendance percentage of ((100 − 2) / 100) × 100% = 98%. With this adjustment, all criteria are profit-type. This result also indicates that each time a calculation is performed, the system must check the condition $\Phi j > 0$.

Step 1: Decision Matrix

The decision matrix X, sized 15 × 5, after the C2 adjustment, is presented in Table 6. The last row contains the maximum value of each criterion used in the normalisation stage.

Table 6. Decision Matrix

Alternative	C1	C2 (%)	C3	C4	C5
A1	86	98	4	85	82
A2	88	100	3	80	88
A3	90	97	5	78	80
A4	82	99	2	90	85
A5	85	96	3	75	78
A6	79	100	4	88	86
A7	91	98	2	72	75
A8	84	95	5	86	90
A9	87	99	3	82	79
A10	80	97	1	70	72
A11	89	100	4	91	87
A12	83	94	2	77	81
A13	92	98	3	84	76
A14	81	99	5	79	84
A15	85	97	4	83	83
Maks	**92**	**100**	**5**	**91**	**90**

Step 2: Normalisation of the Decision Matrix

All criteria are benefit-type, so normalisation uses Equation (2.2), which is $N_{ij} = x_{ij} / xj^{max}$. The calculation for alternative A1 is as follows.

$N_{11} = 86 / 92 = 0.9348$

$N_{12} = 98 / 100 = 0.9800$

$N_{13} = 4 / 5 = 0.8000$

$N_{14} = 85 / 91 = 0.9341$

$N_{15} = 82 / 90 = 0.9111$

In the same way, the normalised matrix for all alternatives was obtained as presented in Table 7.

Table 7. Normalised Matrix N_{ij}

Alternative	C1	C2	C3	C4	C5
A1	0,9348	0,9800	0,8000	0,9341	0,9111
A2	0,9565	1,0000	0,6000	0,8791	0,9778
A3	0,9783	0,9700	1,0000	0,8571	0,8889
A4	0,8913	0,9900	0,4000	0,9890	0,9444
A5	0,9239	0,9600	0,6000	0,8242	0,8667
A6	0,8587	1,0000	0,8000	0,9670	0,9556
A7	0,9891	0,9800	0,4000	0,7912	0,8333
A8	0,9130	0,9500	1,0000	0,9451	1,0000
A9	0,9457	0,9900	0,6000	0,9011	0,8778
A10	0,8696	0,9700	0,2000	0,7692	0,8000
A11	0,9674	1,0000	0,8000	1,0000	0,9667
A12	0,9022	0,9400	0,4000	0,8462	0,9000
A13	1,0000	0,9800	0,6000	0,9231	0,8444
A14	0,8804	0,9900	1,0000	0,8681	0,9333
A15	0,9239	0,9700	0,8000	0,9121	0,9222

Step 3: Normalised Average Performance Score

The average value for each criterion is calculated for criterion C1: $\bar{N}1 = (1/15) \times \Sigma$ Ni1 = 13.9348 / 15 = 0.9290 The results for the other criteria are $\bar{N}2 = 0.9780$, $\bar{N}3 = 0.6667$, $\bar{N}4 = 0.8938$, and $\bar{N}5 = 0.9081$.

Step 4: Evaluate Preference Variation

The value of preference variation is calculated as the sum of the squares of the differences between the normalised value and the average value. For A1 on criterion C1, $(N11 - \bar{N}1)2 = (0.9348 - 0.9290)2 = 0.0000$. The complete results are presented in Table 8; the total row represents the PVj value.

Table 7. Squared Differences $(N_{ij} - \bar{N}_j)^2$ and PV_j Values

Alternative	C1	C2	C3	C4	C5
A1	0,0000	0,0000	0,0178	0,0016	0,0000
A2	0,0008	0,0005	0,0044	0,0002	0,0048
A3	0,0024	0,0001	0,1111	0,0013	0,0004
A4	0,0014	0,0001	0,0711	0,0091	0,0013
A5	0,0000	0,0003	0,0044	0,0048	0,0017
A6	0,0049	0,0005	0,0178	0,0054	0,0022
A7	0,0036	0,0000	0,0711	0,0105	0,0056
A8	0,0003	0,0008	0,1111	0,0026	0,0084
A9	0,0003	0,0001	0,0044	0,0001	0,0009
A10	0,0035	0,0001	0,2178	0,0155	0,0117
A11	0,0015	0,0005	0,0178	0,0113	0,0034
A12	0,0007	0,0014	0,0711	0,0023	0,0001
A13	0,0050	0,0000	0,0044	0,0009	0,0041
A14	0,0024	0,0001	0,1111	0,0007	0,0006
A15	0,0000	0,0001	0,0178	0,0003	0,0002
PV_{j}	**0,0269**	**0,0046**	**0,8533**	**0,0666**	**0,0455**

Step 5–6: Deviation of Preference Values and Criteria Weights

The deviation of the preference value is calculated, while the criterion weight is calculated for criterion C1: $\Phi 1 = 1 - 0.0269 = 0.9731$ $\psi 1 = 0.9731 / 4.0030 = 0.2431$.

Table 8. Deviation of Preference Values and Criteria Weights

Component	C1	C2	C3	C4	C5	Σ
PV_j	0,0269	0,0046	0,8533	0,0666	0,0455	
Φ_j	0,9731	0,9954	0,1467	0,9334	0,9545	4,0030
ψ_j	0,2431	0,2487	0,0366	0,2332	0,2384	1,0000
Weighted ranking	2	1	5	4	3	

All values of Φj are positive and the sum of the weights ψj equals 1, so the criteria weights are valid for use in the next stage.

Step 7: Preference Selection Index

The PSI index for each alternative is calculated as the sum of the product of the normalised value and the criterion weight. The calculation for alternative A11 is as follows.

I_{11} = (0,9674 × 0,2431) + (1,0000 × 0,2487) + (0,8000 × 0,0366) +

(1,0000 × 0,2332) + (0,9667 × 0,2384) = 0,9768

The contribution of each criterion (Nij × ψj) and the index value Ii for all alternatives are presented in Table 8.

Table 8. Weighted Matrix and PSI Index

Alternative	C1	C2	C3	C4	C5	I_i
A1	0,2272	0,2437	0,0293	0,2178	0,2172	**0,9353**
A2	0,2325	0,2487	0,0220	0,2050	0,2331	**0,9413**
A3	0,2378	0,2412	0,0366	0,1999	0,2119	**0,9275**
A4	0,2167	0,2462	0,0147	0,2306	0,2252	**0,9333**
A5	0,2246	0,2387	0,0220	0,1922	0,2066	**0,8841**
A6	0,2087	0,2487	0,0293	0,2255	0,2278	**0,9400**
A7	0,2404	0,2437	0,0147	0,1845	0,1987	**0,8820**
A8	0,2220	0,2362	0,0366	0,2204	0,2384	**0,9536**
A9	0,2299	0,2462	0,0220	0,2101	0,2093	**0,9174**
A10	0,2114	0,2412	0,0073	0,1794	0,1907	**0,8300**
A11	0,2352	0,2487	0,0293	0,2332	0,2305	**0,9768**
A12	0,2193	0,2337	0,0147	0,1973	0,2146	**0,8796**
A13	0,2431	0,2437	0,0220	0,2152	0,2013	**0,9253**
A14	0,2140	0,2462	0,0366	0,2024	0,2225	**0,9218**
A15	0,2246	0,2412	0,0293	0,2127	0,2199	**0,9277**

Step 8: Ranking

Alternatives are ranked based on the value of Ii from highest to lowest. The ranking results are presented in Table 9. The table uses a quota of three candidates; the actual quota follows the school's regulations, which is the number of candidates set by the school.

Table 9. Results of the Ranking of Prospective Student Council Chairpersons

Ranking	Alternative	Indeks I_i	Explanation
1	A11	0,9768	Recommended as a candidate
2	A8	0,9536	Recommended as a candidate
3	A2	0,9413	Recommended as a candidate
4	A6	0,9400	Not recommended
5	A1	0,9353	Not recommended
6	A4	0,9333	Not recommended
7	A15	0,9277	Not recommended
8	A3	0,9275	Not recommended
9	A13	0,9253	Not recommended
10	A14	0,9218	Not recommended
11	A9	0,9174	Not recommended
12	A5	0,8841	Not recommended
13	A7	0,8820	Not recommended
14	A12	0,8796	Not recommended
15	A10	0,8300	Not recommended

Based on Table 4.8, the three candidates with the highest indices are A11 (0.9768), A8 (0.9536), and A2 (0.9413). They are all recommended to the OSIS advisor as candidates for the OSIS Chairperson who will participate in the voting. The candidate with the lowest index is A10 (0.8300).

3. Criteria Weight Analysis

The PSI weight results place C2 as the criterion with the highest weight (0.2487), followed by C1 (0.2431), C5 (0.2384), and C4 (0.2332). These four weights are relatively close,

ranging from 0.23 to 0.25. In contrast, C3 (organisational experience) only received a weight of 0.0366, much smaller than the other criteria.

This difference is consistent with the characteristics of PSI described in the previous section. The weight is derived from the inverse of data variation, so the criterion with the most diverse values receives the smallest weight. C3 is measured on an ordinal scale of 1–5, so its normalised values range from 0.2000 to 1.0000 (PV3 = 0.8533). In contrast, the attendance percentage ranges from 94–100%, making it almost uniform (PV2 = 0.0046) and thus it receives the highest weight. This finding has two implications. First, the PSI weight reflects the distribution of data, not the importance level of the criteria according to the school. In other words, the criteria that most differentiate the candidates have the least impact. Second, the measurement scale significantly affects the weight. Therefore, in research with actual data, the researcher will discuss the C3 scale with the school, for example, changing the 1–5 scale to a 0–100 score based on a rubric, and comparing the PSI results.

4. Analysis of Ranking Results

A11 ranks first because it has high and consistent scores in heavily weighted criteria: report card score 89, attendance 100%, leadership 91, and communication 87. A8 ranks second despite having lower attendance (95%) because it excels in leadership (86) and communication (90). Conversely, A10 ranks last because it has the lowest scores in almost all criteria, including leadership (70) and communication (72). The ranking results also show several pairs of alternatives with very small index differences, namely A15 and A3 (difference of 0.0002), as well as A2 and A6 (difference of 0.0013). Such a small difference indicates that both candidates are practically equal. If such pairs are at the candidate quota limit, OSIS advisors are advised to consider additional information, such as direct interview results, before finalising the candidates.

5. Comparative Analysis with Uniform Weights

To determine the effect of PSI weighting on the results, the PSI ranking is compared with the ranking obtained when all criteria are given equal weight (0.2). This comparison is of a comparative analysis nature and not validation; validation of the OSIS advisor's assessment is conducted with actual data. The results are presented in Table 10.

Table 10. Comparison of PSI Rankings and Uniform Weights

Alternative	Indeks PSI	PSI Ranking	Equal Weight Index	Equal Weight Ranking	d_i^2
A11	0,9768	1	0,9468	2	1
A8	0,9536	2	0,9616	1	1
A2	0,9413	3	0,8827	8	25
A6	0,9400	4	0,9163	5	1
A1	0,9353	5	0,9120	6	1
A4	0,9333	6	0,8430	11	25
A15	0,9277	7	0,9056	7	0
A3	0,9275	8	0,9389	3	25
A13	0,9253	9	0,8695	9	0
A14	0,9218	10	0,9344	4	36
A9	0,9174	11	0,8629	10	1
A5	0,8841	12	0,8350	12	0
A7	0,8820	13	0,7987	13	0
A12	0,8796	14	0,7977	14	0
A10	0,8300	15	0,7218	15	0

The Spearman correlation coefficient is calculated as follows: $\rho = 1 - (6 \times 116) / (15 \times (152 - 1)) = 0.7929$ Significance is tested using the t-statistic approach, which is $t = \rho\sqrt{((n - 2) / (1 - \rho 2))} = 4.6909$. This value is greater than the t-table (df = 13; $\alpha = 0.05$; two-tailed) of 2.1604, with p = 0.0004. This means that there is a significant positive correlation between the two rankings. Nevertheless, the value of $\rho = 0.7929$ indicates that the PSI weighting still shifts the positions of several candidates.

The three largest shifts occurred in A14 (C3 = 5; attendance 99%; rank 4 → 10), A2 (C3 = 3; attendance 100%; rank 8 → 3), A4 (C3 = 2; attendance 99%; rank 11 → 6). This shift occurred because PSI reduced the influence of C3 and increased the influence of criteria with uniform data, especially attendance (C2). Candidates with high organisational experience but moderate scores in other criteria tend to have their rankings drop, while candidates with moderate or low organisational experience but high attendance tend to have their rankings rise. This pattern emphasises that the selection results are greatly influenced by how the C3 criteria are measured.

Conclusion

The PSI method can be used to select the OSIS chairperson candidate without the need to subjectively assign criterion values. The weights are calculated objectively based on the variation of the candidates' data. In the simulation data of 15 candidates, the weight of C2 attendance percentage (0.2487), C1 average report card score (0.2431), C5 communication and vision and mission (0.2384), C4 leadership (0.2332), and C3 organisational experience. The weights are declared valid because the total weight equals 1 and the total deviation value Φj is positive. Thus, the source of subjectivity in the weighting stage can be eliminated. This is the reason why methods such as SAW, AHP, TOPSIS, WASPAS, and MAUT cannot be used in previous research.

The PSI method produces measurable and trackable candidate rankings. In the simulation data, A11 has the highest index (0.9768), followed by A8 (0.9536) and A2 (0.4913), and A10 has the lowest index (0.8300). You can see every step of the calculation, from normalisation to the final index. This makes the decision-making process clearer and allows both schools and students to be accountable for the results.

The PSI weights show data distribution, not the importance level of the criteria according to the school. The organisational experience criterion (C3), which is rated on a scale of 1–5, has the largest variation (PV3 = 0.8533), resulting in a weight of only 0.0366. Comparison with uniform weights yields a significant Spearman correlation of 0.7929 (t = 4.6909 greater than the table t of 2.1604). But the ranking of A14 changed from 4 to 10, A2 changed from 8 to 3, and A4 changed from 11 to 6. This means that the measurement scale of each criterion greatly influences the selection results.

References

[1] R. Indonesia, “Presiden republik indonesia,” 2003.

[2] P. Kajian *et al.*, “Pendidikan politik di sekolah melalui pemilihan ketua osis,” vol. 2, no. 1, pp. 33–41, 2022.

[3] R. Trisudarmo, D. P. Wati, and R. Nursyamsu, “Implementasi Metode MAUT pada Sistem Penunjang Keputusan dalam Perancangan Sistem E-Voting Pemilihan Calon Ketua OSIS,” vol. 02, pp. 191–199, 2024, doi: 10.21456/vol14iss2pp191-199.

[4] K. Ketua, W. Ketua, and V. Chairperson, “Application of the TOPSIS Method in the Decision Support System Selecting,” vol. 10, no. 2, pp. 467–480, 2025.

[5] R. Masdalipa, D. Gusmaliza, and R. Syahri, “Sistem Pendukung Keputusan Pemilihan Ketua Osis Di Sekolah Menengah Atas (SMA) Negeri 1 Mulak Ulu Menggunakan Metode Analytical Hierarchy Process (AHP),” vol. 3, no. 1, pp. 1–8, 2022.

[6] B. J. Makalmai, L. Indrayani, J. Tonapa, and I. Leppang, “Sistem Pendukung Keputusan

Pemilihan Ketua OSIS SMP Inam Kebar Berbasis Web SAW," vol. 4, no. 3, pp. 7318–7324, 2025.
[7] U. Sicherheitssystem, "Access to Schweizer-Online temporarily blocked," p. 97914.
[8] E. Jurnal, "Implementasi Metode WASPAS dalam Sistem Pendukung Keputusan Pemilihan Ketua OSIS di SMK Al-Ikhlas Losari," vol. 18, no. 1, pp. 183–195, 2025.
[9] R. Attri and S. Grover, "Application of preference selection index method for decision making over the design stage of production system life cycle," *J. King Saud Univ. - Eng. Sci.*, vol. 27, no. 2, pp. 207–216, 2015, doi: 10.1016/j.jksues.2013.06.003.
[10] F. Nugroho and E. Buulolo, "Sistem Pendukung Keputusan Pemilihan Instruktur Bimbingan Belajar Menggunakan Metode PSI (Preference Selection Index)," vol. 4, no. 3, pp. 1447–1455, 2022, doi: 10.47065/bits.v4i3.2695.
[11] S. Sundari, M. N. Fadli, D. Hartama, and A. Perdana, "Decision Support System on Selection of Lecturer Research Grant Proposals using Preferences Selection Index Decision Support System on Selection of Lecturer Research Grant Proposals using Preferences Selection Index," 2019, doi: 10.1088/1742-6596/1255/1/012006.
[12] N. P. Rizanti, L. T. Sianturi, and M. Sianturi, "Sistem Pendukung Keputusan Pemilihan Siswa Pertukaran Pelajar Menggunakan Metode PSI (Preference Selection Index)," pp. 263–269, 2019.
[13] M. Rizki and G. Ginting, "Penerapan Metode Preference Selection Index Dalam Pemilihan Teller Terbaik," vol. 2, no. 2, pp. 127–134, 2020.
[14] A. Idaman, "Supply chain efficiency transformation : analysis of raw material staff selection based on preference selection index," vol. 14, no. 3, pp. 2459–2470, 2025, doi: 10.11591/ijai.v14.i3.pp2459-2470.
[15] T. A. Tanjung, A. N. Kusuma, N. D. Pratiwi, and A. Sari, "Penerapan Metode PSI (Preference Selection Index) dalam Sistem Pendukung Keputusan Pemilihan Ekstrakurikuler," vol. 4, no. 3, pp. 2231–2239, 2026.