Teacher Selection Analysis at Pangkalpinang Baptist School Using SAW Method

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***Abstract*— Selecting competent teachers plays a vital role in enhancing the quality of education at Pangkalpinang Baptist School. However, the use of subjective judgment in the recruitment process often leads to less effective decision-making. Therefore, this research aims to examine the teacher selection mechanism by applying the Simple Additive Weighting (SAW) method to strengthen the objectivity and precision of the selection decisions. The SAW approach assesses applicants using three main criteria: interview performance (30%), academic test results (35%), and micro teaching skills (35%).Each criterion receives specific weights according to importance levels, followed by calculations to determine candidates with the highest scores. Research results demonstrate that SAW method implementation provides more systematic and transparent decisions in teacher selection. The study evaluated 10 teacher candidates with Eka Sitompul achieving the highest score of 0.85, followed by Fandi Saputra and Vitta Natalia with 0.825 each. This method enables schools to conduct data-based selection, reducing subjectivity in recruitment processes and ensuring selected teaching staff possess competencies aligned with school requirements.**

Keywords*— Decision Making, Education Quality, SAW Method, Simple Additive Weighting, Teacher Selection.

I. Introduction

Selecting qualified teachers represents one of the key factors in enhancing educational quality in schools. Pangkalpinang Baptist School, as a faith-based educational institution, maintains specific standards for teacher recruitment to ensure candidates possess not only academic competencies but also character traits aligned with school values [1].

Teacher selection processes require consideration of various criteria including educational qualifications, teaching experience, pedagogical competencies, and personality and moral aspects. However, selection processes are often conducted subjectively without structured methodologies, risking suboptimal decision outcomes. Therefore, systematic and data-driven methods are needed to enhance objectivity in teacher selection [2].

Simple Additive Weighting (SAW) represents one of the Multi-Criteria Decision Making (MCDM) methods applicable for teacher selection processes. The SAW method operates by assigning weights to predetermined criteria, then performing calculations to determine optimal candidates based on obtained scores. This method aims to make teacher selection decisions more transparent, accurate, and accountable [3].

This research analyzes teacher selection processes at Pangkalpinang Baptist School by implementing the SAW method. The study serves as a reference for schools to improve teacher recruitment process effectiveness and ensure selected teaching staff truly meet established standards [4].

One of the contributions of this study is the use of the SAW approach specifically tailored to the context of a religiously affiliated school, (2) A focus on objectivity using specific criteria that are truly implemented in the real teacher selection process at the school, (3) Transparency of the selection results by openly presenting the weights and final scores of each candidate, (4) Supporting data-driven decision-making, and (5) Providing the best alternative recommendations based on SAW scores.

Previous research on teacher selection using SAW method and Waterfall method included 4 criteria, all representing benefit attributes, with 25 alternatives presented [5]. Another study utilized the ARAS (Additive Ratio Assessment) method with 5 criteria and 15 alternatives [6].

II. Literature Review

A. *Decision Support Systems*

Decision support systems are computer-based interactive tools designed to help decision-makers leverage data and models in addressing unstructured issues [7]. These systems leverage individual intellectual resources combined with computer capabilities to enhance decision quality.

Decision-making stages include [8]:

1. Intelligence Stage: Environmental observation to identify problems requiring resolution. This stage represents thinking development phases requiring information systems for decision-makers to understand internal and external conditions for appropriate final decisions.

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2. Design Stage: Activities for discovering, developing, and analyzing various possible alternative actions. This stage involves analyzing and evaluating various alternatives.
3. Choice and Examine Stage: Decision-makers select and examine action sequences from several alternatives while evaluating chosen actions.

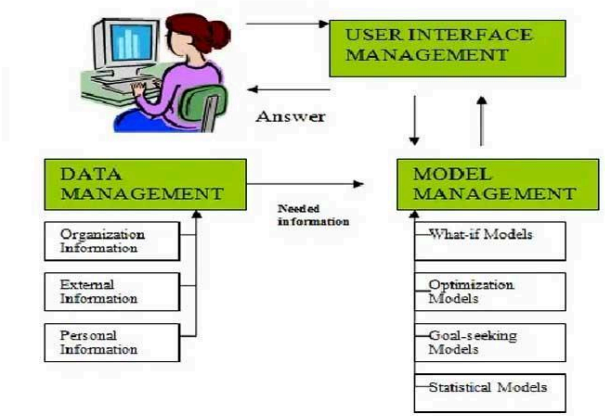

Fig. 1 SPK Components[9]

Decision Support System (DSS) components include three main elements: data management, model management, and dialog management [9].

1. Data Management: Refers to the use of databases that store context-specific information, which are organized and controlled through Database Management Systems (DBMS).
2. Model Management: Involves the use of financial, statistical, management science, and other quantitative models that offer analytical functionality and supporting software management.
3. Communication (Dialog Subsystem): This subsystem enables users to interact with and issue instructions to the DSS, providing an interface composed of three components: action language, display and presentation language, and a knowledge base.

Objectives of Decision Support Systems [10]

1. To help managers make decisions when dealing with semi-structured problems.
2. To enhance managerial judgment by offering support, without aiming to replace the manager's role.
3. To boost productivity. Creating a decision-making team, particularly one that includes experts, can be expensive. A computerized support system can decrease the group size and enable members to collaborate remotely.
4. To improve decision quality. Computer-based systems allow access to more comprehensive data, which makes it possible to examine more alternatives and make better-informed decisions.
5. To enhance competitiveness. Efficient management and utilization of organizational resources are vital, especially as competitive pressures make the decision-making process increasingly complex.

B. *Simple Additive Weighting Method*

Simple Additive Weighting (SAW) method is a decision support system approach used to find optimal solutions by summing weights from normalized criteria. The SAW method is commonly referred to as a scoring technique, as it essentially assigns scores to alternatives based on the predefined weights of each criterion. [11].

SAW Method Stages

The SAW method consists of several main steps:

1. Determining criteria and alternatives
   a. Define criteria used in decision-making
   b. Determine alternatives for evaluation
2. Determining weights for each criterion
   a. Each criterion receives weights based on importance levels
   b. Weights are subjective and typically determined by decision-makers
3. Creating decision matrix
   a. Arrange tables based on alternative values
4. Decision matrix normalization
   a. Values in decision matrices must be normalized for uniform scales
   b. Normalization based on criteria types: benefit or cost
   c. Normalization formulas:
   For benefit criteria: $r_{ij} = x_{ij}/\max(x_{ij})$
   For cost criteria: $r_{ij} = \min(x_{ij})/x_{ij}$
5. Computing the overall value of each option.
   a. The final scores are obtained by adding the results of multiplying normalized values with their respective criteria weights.: $V_i = \Sigma(w_j \times r_{ij})$
6. Determining optimal alternatives
   a. Alternatives with highest scores are most optimal and selected as best decisions

SAW Advantages and Disadvantages

Advantages:

1. Simple and easy to understand
2. Suitable for various multi-criteria decision-making types
3. Provides objective results if weights are properly determined

Disadvantages:

1. Sensitive to assigned weights, requiring careful analysis
2. Does not consider inter-criteria relationships
3. Unsuitable for uncertain criteria values

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Robustness

1. Strong in operational terms (stable, deterministic), but not robust to changes in weights — even small changes in weights can alter the ranking.
2. Does not consider correlations or dependencies between criteria.

Handling Uncertainty

Assumes deterministic numerical values; not suitable for uncertainty or linguistic assessments without modification.

Real-World Validation

Easy to implement and explain the results to stakeholders (transparency). However, validation requires:

1. Sensitivity analysis on the weights;
2. Cross-checking with actual recruitment outcomes (e.g., how the selected teachers perform after several months/years).

C. Data Processing Stages

The steps in the SAW method are:

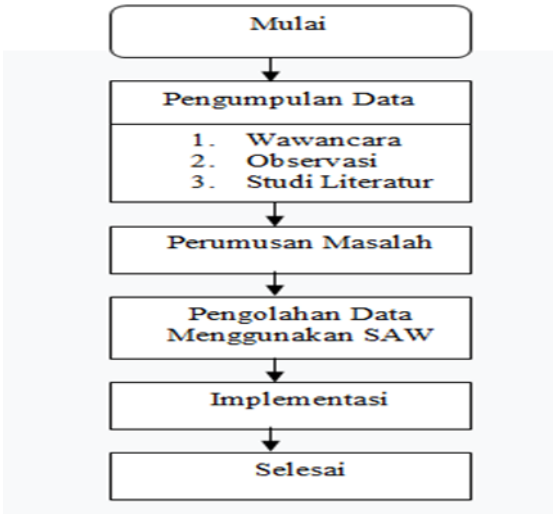

Fig 2. SAW Method Flowchart

The flowchart above represents the SAW method. The steps for data processing using the SAW method include selecting criteria data and several alternatives, subsequently, a decision matrix is developed based on the data from the criteria and the set of alternatives. The next step is to calculate the normalized value. Once the normalized value is obtained, the normalized matrix is multiplied. The subsequent step involves computing the preference value of each alternative to identify which one obtains the highest and lowest weight..

D. Research Flow

Fig 3. Research Flow Scheme

The research flow carried out by the researcher is the first to collect data by conducting interviews with sources, in this case the principal. Then, observation or direct observation of the teacher recruitment process at Kasih Baptist Kindergarten was conducted, then conducted a literature study, namely by reading references in the form of journals related to the topic being worked on. The next step is to formulate the problem, namely by identifying the problems that occur in the current business process, after that looking for solutions or alternative solutions to the problems that occurred. Following the determination of alternative options, data processing was performed using the SAW approach. Upon completion, the processed results were implemented...

III. Research Methodology

This research employs quantitative approaches using the Simple Additive Weighting (SAW) method. Data collection involved interviews with school principals, direct observation of teacher recruitment processes, and literature studies from relevant journals.

The research flow begins with data collection, problem formulation, solution alternative identification, data processing using SAW method, and result implementation. Data includes 10 teacher candidates evaluated using 3 assessment criteria: interviews (30%), academic tests (35%), and micro teaching (35%).

Research stages follow systematic approaches: data collection through interviews and observations, literature review, problem identification, solution alternative analysis, SAW method data processing, and result implementation.

IV. Results and Discussion

A. Criteria Definition

Based on school principal interviews, three main teacher selection criteria were established:

Table 1. Selection Criteria

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Code	Criteria	Weight	Attribute
C1	Interview	30%	Benefit
C2	Academic Test	35%	Benefit
C3	Micro Teaching	35%	Benefit

The data for the criteria above were obtained from interviews with the resource person, namely the school principal. From the interview results, three criteria were identified: interview, academic test, and microteaching. Each criterion's weight represents its level of importance within the overall decision-making framework. Therefore, the resource person assigned the following weights: interview 30%, academic test 35%, and microteaching 35%.

Criteria

Interview (C1)

1 = Very Fluent

0.5 = Moderate

0 = Not Fluent

Academic Test (C2)

1 = Highly Competent

0.5 = Moderate

0 = Not Competent

Micro Teaching (C3)

1 = Highly Skilled

0.5 = Moderate

0 = Not Skilled

Table 2. Normalization Value

	Interview (C1)	Academic Test (C2)	*Micro Teaching* (C3)
Fandi Saputra	1	1	0.5
Eka Sitompul	0.5	1	1
Andreas Gunarto	1	0	1
Vitta Natalia	1	0.5	1
Theodorus Suranto	0.5	1	0
Ribka	0.5	0.5	0.5
Novita Bangun	1	1	0
Rita Astuti	0.5	0.5	1
Prengki Pintubatu	0.5	0	1
Aditya Salindeho	1	0.5	0.5

B. Matrix Values

Table 3. Matrix Values Table

[1 1 0,5 0,5 1 1 1 0 1 1 0,5 1 0 1 0,5 0,5 0,5 0,5 1 1 0 (

C. Weighting for Interview Criteria

Table 4. Table of Weighting for Interview Criteria

No	Participant Name	Weight
1	Fandi Saputra	1
2	Eka Sitompul	0.5
3	Andreas Gunarto	1
4	Vitta Natalia	1
5	Theodorus Suranto	0.5
6	Ribka	0.5
7	Novita Bangun	1
8	Rita Astuti	0.5
9	Prengki Pintubatu	0.5
10	Aditya Salindeho	1

The interview criteria are the benefit attributes so:
R11=1/1=1
R21=0.5/1=0.5
R31=1/1=1
R41=1/1=1
R51=0.5/1=0.5
R61=0.5/1=0.5
R71=1/1=1
R81=0.5/1=0.5
R91=0.5/1=0.5
R101=1/1=1

D. Weighting for Academic Test Criteria

Table 5. Table of Weighting for Academic Test Criteria

No	Participant Name	Weight
1	Fandi Saputra	1
2	Eka Sitompul	1
3	Andreas Gunarto	0
4	Vitta Natalia	0.5
5	Theodorus Suranto	1
6	Ribka	0.5
7	Novita Bangun	1
8	Rita Astuti	0.5
9	Prengki Pintubatu	0
10	Aditya Salindeho	0.5

The academic test criteria are the benefit attributes so:
R12=1/1=1
R22=1/1=1
R32=0/1=0
R42=0.5/1=0.5
R52=1/1=1
R62=0.5/1=0.5
R72=1/1=1
R82=0.5/1=0.5
R92=0/1=0
R102=0.5/1=0.5

E. Weighting for *Micro Teaching* Criteria

Table 6. Table of Weighting for *Micro Teaching* Criteria

No	Participant Name	Weight
1	Fandi Saputra	0.5
2	Eka Sitompul	1

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3	Andreas Gunarto	1
4	Vitta Natalia	1
5	Theodorus Suranto	0
6	Ribka	0.5
7	Novita Bangun	0
8	Rita Astuti	1
9	Prengki Pintubatu	1
10	Aditya Salindeho	0.5

The *Micro Teaching* criteria are benefit attributes so :
R13=0.5/1=0.5
R23=1/1=1
R33=1/1=1
R43=1/1=1
R53=0/1=0
R63=0.5/1=0.5
R73=0/1=0
R83=1/1=1
R93=1/1=1
R103=0.5/1=0.5

The evaluation of micro teaching and teaching activities is carried out by the school principal, as they are responsible for the recruitment process and understand the school's values and needs. The principal also has the authority to ensure that the selected teachers truly meet the academic, pedagogical, and ethical standards of the institution and conducts direct monitoring of teacher performance over a certain period (such as during the probation or initial contract phase).

R=
[1 1 0. 5 0. 5 1 1 1 0 1 1 0. 5 1 0. 5 1 0 0. 5 0. 5 0. 5 1 1 0 0.

W = [0. 30 0. 35 0. 35]

Preference Value
V1 = (0.30x1)+(0.35x1)+(0.35x0.5)
= 0.3+0.35+0.175 = 0.825
V2 = (0.30x0.5)+(0.35x1)+(0.35x1)
= 0.15+0.35+0.35 = 0.85
V3 = (0.30x1)+(0.35x0)+(0.35x1)
= 0.30+0+0.35 = 0.65
V4 = (0.3*1) + (0.35*0.5) + (0.35*1)
= 0.3+0.175+0.35
V5 = (0.3*0.5) + (0.35*1) + (0.35*0)
= 0.15+0.35+0=0.5
V6 = (0.3*0.5) + (0.35*0.5) + (0.35*0.5)
= 0.15+0.175+0.175=0.5
V7 = (0.3*1) + (0.35*1) + (0.35*0)
= 0.3+0.35+0=0.65
V8 = (0.3*0.5) + (0.35*0.5) + (0.35*1)
= 0.15+0.175+0.35=0.675
V9 = (0.3*0.5) + (0.35*0) + (0.35*1)
= 0.15+0.175+0.175=0.5
V10 = (0.3*1) + (0.35*0.5) + (0.35*0.5)
= 0.3+0.175+0.175=0.65

Discussion

This research shows that applying the Simple Additive Weighting (SAW) method in the teacher recruitment process at Pangkalpinang Baptist School effectively improves the objectivity, transparency, and accountability of decision-making. The evaluation results show that the method provides clear and systematic scoring based on the three actual criteria used in the recruitment process: interview performance, academic test, and micro teaching. The findings indicate that SAW effectively supports data-driven decision-making by identifying the most suitable candidate, with Eka Sitompul achieving the highest score (0.85), followed by Fandi Saputra and Vitta Natalia (0.825).

However, this study has several limitations. First, the scope of evaluation is limited to only 10 candidates, which may reduce the generalizability of the results. Second, no sensitivity analysis was conducted to observe the impact of changes in weight distribution on ranking stability, even though SAW is known to be sensitive to weight assignment. Third, the study did not validate the SAW results with real-world teaching performance after hiring, which is important to confirm the accuracy and reliability of the model in practice.

From these limitations, several lessons can be drawn. The use of SAW is effective for transparent and straightforward decision-making, but its reliability in educational contexts may improve if combined with techniques capable of addressing weight sensitivity and uncertainty in assessments. Additionally, validation using post-selection teacher performance would provide stronger evidence of the model's practical effectiveness.

Future research could explore the integration of Machine Learning to dynamically adjust criterion weights based on historical recruitment data or incorporate uncertainty modeling using fuzzy logic, TOPSIS, or probabilistic MCDM approaches to improve robustness. Longitudinal studies are also recommended to compare SAW-based selection outcomes with actual teaching performance in the school environment.

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