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A Comparison of Product Weight Method and Simple Addition Weight Method in Employee Selection System

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Abstract: Tegar Mandiri Steam Ironing Service is a business operating in the steam ironing service industry, located in the Boyolali area, specifically in Dlingo Village, Mojosongo Subdistrict, Boyolali Regency, Central Java. "Tegar Mandiri" still employs conventional methods in the selection and recruitment of employees without leveraging technology. Although the implementation of conventional employee recruitment has been smooth, several issues have arisen. For instance, prospective applicants must visit in person to find out about job vacancies. Furthermore, the registration process for potential employees is still manually executed, requiring individuals to physically visit the site. Consequently, the administrative staff must record each applicant's details individually, leading to an ineffective data collection process and vulnerability to data loss or damage in physical records. The implementation phase was conducted through coding in PHP, adopting the Simple Additive Weighting (SAW) and Weight Product (WP) methods. Although both methods exhibit minor differences in their comparison, the results tend to favor the SAW method. The accuracy level of the SAW method reaches 96% as it has advantages over the WP method in terms of data normalization. The SAW method can address issues related to scale and unit differences among various criteria. Therefore, the SAW method is more accurate and dominant in determining the priority of employee recruitment.

Keywords: Employees; PHP; Selection; Simple Additive Weighting; Weight Product.

1. Introduction

A prevalent challenge encountered before commencing employment is the selection test required for entry into a desired company. Success in these tests hinges on adhering to the conditions set by the target company; failure to comply significantly diminishes the chances of employment [1]. Tegar Mandiri, a garment services enterprise, offers services such as clothing packing, button attachment, folding, thread removal, and steam ironing. Situated in Dk. Purworejo, RT.008 RW. 002 Ds. Dlingo, Mojosongo Subdistrict, Boyolali Regency, Tegar Mandiri currently employ a team of 50. Its employee selection system, however, is still manually operated, leading to various issues. First is the extensive use of paper, as the company relies on folio sheets for each employee selection. The second issue is the cumbersome process of retrieving employee documents due to manual searching. Lastly, there is a significant time waste; the registration-to-acceptance process takes approximately 5-7 days, attributed to the company's unstructured mechanism [2].

This study aims to create a web-based application that provides information on job vacancies, the registration process, and the calculation of selection scores for prospective employees using the Simple Additive Weighting (SAW) and Weight Product (WP) methods. This development is expected to streamline the employee recruitment process. The SAW and WP methods are applied in selection tests including ironing, packing, button attachment, folding, and thread counting. These methods are used to calculate averages for prioritizing employee recruitment at Tegar Mandiri [3].

In conducting this research, references were made to various studies that identified issues related to job vacancy information using different methods. Naramessakh & Prianto's research explored establishing loan recipient criteria for micro-enterprises set by PT. Pos Indonesia. Data were collected through observation and interviews, then processed using the WP method. The findings could effectively identify potential clients based on capability and quality [4]. Marbun *et al*. discussed the application of WP in selecting the best investigator, with a standard of five samples from SAT Narkoba Polres Deli Serdang. The WP approach resulted in a ranking system [5]. Ferdian study applied the SAW method for selecting new employees at Ceria TV, considering age, academic level, work experience, interview outcomes, and skills [6]. Nurlela *et al*. used quantitative techniques to explore preferences using the SAW method, evaluating each major at Sirajul Falah SMK and determining the most popular department [7]. Maulana *et al*. discussed recruiting potential employees at Hyfresh Blitar, comparing the SAW and WP methods. The SAW method proved more effective, with a 96.5% success rate [8].

2. Research Method

2.1. Research Stages

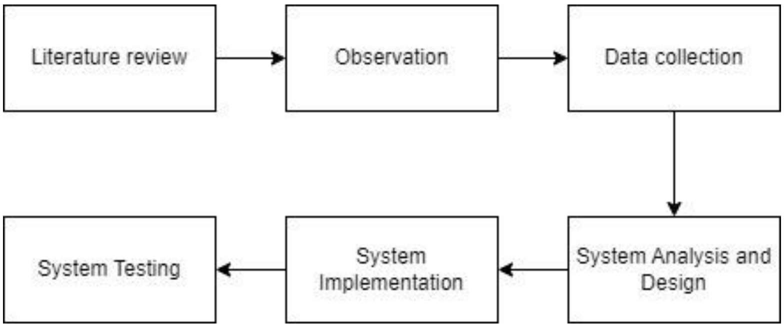

Figure 1. Research Stages

The above figure represents the steps involved in the research methodology. Further explanation of each stage is provided below.

1) Literature Study
A literature study is a crucial part of the research process, involving the search for theoretical references related to the research problem. These references are sourced from various materials, including journals, articles, books, magazines, and other research documents. The purpose of a literature study is to collect information that can serve as supportive references for the research.
2) Observation
Observation is a method of direct and in-depth examination at the research site and is a key component of the data collection process. Its aim is to understand the ongoing conditions or to verify the validity of the research design being implemented.
3) Data Collection
The goal of data collection is to gather observations relevant to the system's needs, problems to be solved, and solutions to be implemented. It also details how the system workflow will be constructed. The data collection process involves observation, interviews, and assessment.
4) Analysis and System Design
System design serves as a roadmap for the development of the system to be implemented. This study's analysis includes three types of system analysis: operating systems, functional requirements, and non-functional requirements. Physical and logical design are two aspects that form the system design. Logical design illustrations include miniature diagrams, DFDs, ERDs, links between tables, and context diagrams. Physical design uses a database management system (DBMS) to define the physical structure of the database.
5) System Implementation
During this phase, a website will be developed as the system. Determining the hardware and software for system development and formulating the designed system interface are parts of system implementation. The WP and SAW techniques are used in the decision-making process for personnel selection during system implementation.
6) System Testing
This stage ensures that the system works optimally for users. It also aims to identify deficiencies and errors in the system.

2.2. Database
The database is used as a storage for documents. Like a filing cabinet, it manages data by grouping them according to type and organizing placement for easier management and retrieval. Its principle of operation is similar, with the main goal being to facilitate and expedite the retrieval of data/archives [9].

2.3. CodeIgniter
CodeIgniter is an early and basic PHP framework, an open-source PHP framework. CodeIgniter employs the Model, View, Controller (MVC) technique. It is stated on the official CodeIgniter website that the framework is a powerful PHP application with relatively few complications [10].

2.4. Simple Additive Weight (SAW)
SAW is an approach from the Multi Criteria Decision Making (MCDM) concept, known as the weighted sum approach, where this algorithm implements a weighted sum for all attribute variables across all alternatives [11]. The primary goal is to enable SAW to compare alternatives more equitably and produce highly accurate calculations [12]. The stages in the SAW method include [13]:

1) Analyzing Criteria
   Involves assessing whether criteria are cost or benefit types, then converting all attribute scores in line with Crisp data scores. If attributes lack Crisp data, original scores are used directly.
2) Normalization
   Converts attribute scores to a 0-1 scale range, considering the type of criteria, i.e., cost or benefit, using the formula:

$$r_{ij} = \begin{cases} \dfrac{x_{ij}}{\mathrm{Min}_i\, x_{ij}} \text{If j is the cost attribute} \\ \dfrac{x_{ij}}{\mathrm{Max}_i\, x_{ij}} \text{ If j is the benefit attribute} \end{cases}$$

   Information:
   r_{ij}: Alternative normalization results per attribute
   x_{ij}: Alternative assessment per attribute

3) Ranking
   This is the main part where the total attributes are multiplied by the criteria weight for each alternative, with a formula:

$$V_i = \sum_{j=1}^{n} w_j r_{ij}$$

Information:
   V_i: Alternative normalization results per attribute
   w_j: Criteria weight
   r_{ij}: Normalization of alternatives per attribute

2.5. Weight Product (WP)
Weighted Product is a method from the Multi Criteria Decision Making (MCDM) concept [14] involving a normalization process in its calculation. The WP method aims to develop decision-support software that can be used as an option for choice and gives weight to the comparison between alternatives and criteria [15]. This method is used for evaluating several alternatives across a group of attributes or criteria, where all attributes are independent of each other [16]. The Weighted Product (WP) method involves the following steps [17].

1) Setting criteria for evaluation.
2) Assessing the weight of importance for each criterion.
3) Establishing value range for each criterion.
4) Evaluating alternatives by applying all attributes, considering the score range that indicates the importance of the criterion.
5) Combining attribute weight assessment and alternative scores in a decision matrix (X).
6) Normalization of criteria weights is conducted using the formula:

$$W_J = \frac{w_j}{\sum w_j}$$

   Information:
   W_j : Criteria weight
   $\sum w_j$: Total weight of criteria

7) Normalization of the decision matrix (S) is done by multiplying each attribute by W_j or criteria weight. The criteria are divided into two categories, namely benefit criteria (with a positive rank) and cost criteria (with a negative rank). The formula for normalizing the matrix (S) is:

$$S_i = \prod_{j=1}^{n} X_{ij\,wj}$$

Information:
w : Criteria weight
S_i : S matrix
n : Total criteria
i : Alternative
X : Criterion score
j : Criteria

8) The ranking process of all alternatives (Vi). In the alternative ranking process, use the following formula:

$$V_i = \frac{\prod_{i=1}^{n} X_{ij\,wj}}{\prod_{j=1}^{n} (X *_j)_{\,wj}}$$

Information:
V_i : Ranking
n : Total criteria
i : Alternative
X : Criterion score
w : Criteria weight
j : Criteria.

3. Result and Discussion

3.1 Results
3.1.1 Data Analysis
After observations and discussions with the "Tegar Mandiri" Steam Ironing team, the following analyzed data were required:

Table 1. Criteria Assessment

Criteria	Value
Loose Threads	30
Folding Clothes	60
Button Attachment	60
Packing	60
Ironing	90

Table 2. Criteria Parameters

Criteria	Parameter	Value
Loose Threads	Not Loose	1
	<5	2
	5-10	3
	11-20	4
	20<	5
Folding Clothes	Untidy	1
	Normal	2
	Neat	3
	Pretty Neat	4
	Very Neat	5
Attach Buttons	Buttons Off	1
	Normal	2
	Neat	3
	Pretty Neat	4
	Very Neat	5
Packing	Not good	1
	Normal	2
	Neat	3

	Pretty Neat	4
	Very Neat	5
Iron	Broken Clothes	1
	Normal	2
	Neat	3
	Pretty Neat	4
	Very Neat	5

In data analysis, it is necessary to have original data that can be converted into alternative value data to suit the method used. The data can be read in the following table:

Table 3. Selection Assessment

Nama	C1	C2	C3	C4	C5
Bambang	3 Threads	Fairly Neat	Fairly Neat	Fairly Neat	Fairly Neat
Aris	4 Threads	Neat	Normal	Neat	Fairly Neat
Agus	6 Threads	Fairly Neat	Fairly Neat	Fairly Neat	Fairly Neat
Siti	Not Loose	Very Neat	Very Neat	Very Neat	Very Neat
Marni	Not Loose	Fairly Neat	Very Neat	Fairly Neat	Very Neat
Sapto	Not Loose	Very Neat	Fairly Neat	Very Neat	Fairly Neat
Rudi	3 Threads	Fairly Neat	Neat	Neat	Fairly Neat
Agung	Not Loose	Fairly Neat	Fairly Neat	Fairly Neat	Fairly Neat
Wawan	Not Loose	Fairly Neat	Fairly Neat	Very Neat	Fairly Neat
Yuni	Not Loose	Fairly Neat	Very Neat	Very Neat	Very Neat

3.2. Application Simple Additive Weight (SAW)
For the SAW method analysis, the values of criteria, criteria weights, and alternative values are necessary. The steps in the SAW process include [18]:

1) Determination of criteria and their weights
Next is determining the criteria. Each criterion, symbolized as Ci, will be given a Cost or Benefit attribute, which reflects the nature of the criterion in the decision-making process. The Cost attribute indicates that the smaller the attribute value, the better, while the Benefit attribute indicates profit, which means the greater the attribute value, the better. This information is available in the following table:

Table 4. Criteria

Criteria	Score	Code	Cost/Benefit
Loose threads	30	C1	Cost
Folding clothes	60	C2	Benefit
Attach Buttons	60	C3	Benefit
Packing	60	C4	Benefit
Iron	90	C5	Benefit

2) Calculation of the relative value of the initial weight
The third step will be calculated as follows:
C1= 30/300 = 0.1
C2= 60/300 = 0.2
C3= 60/300 = 0.2
C4= 60/300 = 0.2
C5= 90/300 = 0.3
Total (Σ_{wj}) = 0.1 + 0.2 + 0.2 + 0.2 + 0.3 = 1

Table 5. Relative Weight

$w_{relatively}$	0.1	0.2	0.2	0.2	0.3

3) Making a difference matrix between Alternatives and Criteria

The next step is to fill in the values for each alternative by building a matrix that compares each with criteria using the original data. This comparison matrix is used to evaluate alternatives based on predetermined criteria. To complete the comparison value between criteria and alternatives, you can refer to table 3, which contains employee selection results, and refer to Table 2, which is the criteria parameters as a guide in filling in. The results of filling in this comparison matrix will be documented in the table below:

Table 6. Difference matrices A and C

Alternative	Criteria				
	C1	C2	C3	C4	C5
Bambang	2	4	4	4	4
Aris	2	3	2	3	3
Agus	3	4	4	4	4
Siti	1	5	5	5	5
Marni	1	4	5	4	5
Sapto	1	5	4	5	4
Rudi	2	4	3	3	4
Agung	1	4	4	4	4
Wawan	1	4	4	5	4
Yuni	1	4	5	5	5

4) Normalization Process

The normalization function is to determine the normalization performance assessment of each alternative. By normalizing the values obtained below:

a. Criteria C1 (Cost)

$\mathbf{r}^{11}=\frac{Min(2;2;3;1;1;1;2;1;1;1)}{2}=\frac{1}{2}=0{,}5$

$\mathbf{r}^{21}=\frac{Min(2;2;3;1;1;1;2;1;1;1)}{2}=\frac{1}{2}=0{,}5$

$\mathbf{r}^{31}=\frac{Min(2;2;3;1;1;1;2;1;1;1)}{3}=\frac{1}{3}=0{,}33$

$\mathbf{r}^{41}=\frac{Min(2;2;3;1;1;1;2;1;1;1)}{1}=\frac{1}{1}=1$

$\mathbf{r}^{51}=\frac{Min(2;2;3;1;1;1;2;1;1;1)}{1}=\frac{1}{1}=1$

$\mathbf{r}^{61}=\frac{Min(2;2;3;1;1;1;2;1;1;1)}{1}=\frac{1}{1}=1$

$\mathbf{r}^{71}=\frac{Min(2;2;3;1;1;1;2;1;1;1)}{2}=\frac{1}{2}=0{,}5$

$\mathbf{r}^{81}=\frac{Min(2;2;3;1;1;1;2;1;1;1)}{1}=\frac{1}{1}=1$

$\mathbf{r}^{91}=\frac{Min(2;2;3;1;1;1;2;1;1;1)}{1}=\frac{1}{1}=1$

$\mathbf{r}^{101}=\frac{Min(2;2;3;1;1;1;2;1;1;1)}{1}=\frac{1}{1}=1$

b. Criteria C2 (Benefit)

$\mathbf{r}^{12}=\frac{4}{Max(4;3;4;5;4;5;4;4;4;4)}=\frac{4}{5}=0{,}8$

$\mathbf{r}^{22}=\frac{3}{Max(4;3;4;5;4;5;4;4;4;4)}=\frac{3}{5}=0{,}6$

$\mathbf{r}^{32}=\frac{4}{Max(4;3;4;5;4;5;4;4;4;4)}=\frac{4}{5}=0{,}8$

$\mathbf{r}^{42}=\frac{5}{Max(4;3;4;5;4;5;4;4;4;4)}=\frac{5}{5}=1$

$\mathbf{r}^{52}=\frac{4}{Max(4;3;4;5;4;5;4;4;4;4)}=\frac{4}{5}=0{,}8$

$\mathbf{r}^{62}=\frac{5}{Max(4;3;4;5;4;5;4;4;4;4)}=\frac{5}{5}=1$

$\mathbf{r}^{72}=\frac{4}{Max(4;3;4;5;4;5;4;4;4;4)}=\frac{4}{5}=0{,}8$

$\mathbf{r}^{82}=\frac{4}{Max(4;3;4;5;4;5;4;4;4;4)}=\frac{4}{5}=0{,}8$

$\mathbf{r}^{92}=\frac{4}{Max(4;3;4;5;4;5;4;4;4;4)}=\frac{4}{5}=0{,}8$

$\mathbf{r}^{102} = \frac{4}{Max(4;3;4;5;4;5;4;4;4;4)} = \frac{4}{5} = 0{,}8$

c. Criteria C3 (Benefit)

$\mathbf{r}^{13} = \frac{4}{Max(4;2;4;5;5;4;3;4;4;5)} = \frac{4}{5} = 0{,}8$

$\mathbf{r}^{23} = \frac{2}{Max(4;2;4;5;5;4;3;4;4;5)} = \frac{2}{5} = 0{,}4$

$\mathbf{r}^{33} = \frac{4}{Max(4;2;4;5;5;4;3;4;4;5)} = \frac{4}{5} = 0{,}8$

$\mathbf{r}^{43} = \frac{5}{Max(4;2;4;5;5;4;3;4;4;5)} = \frac{5}{5} = 1$

$\mathbf{r}^{53} = \frac{5}{Max(4;2;4;5;5;4;3;4;4;5)} = \frac{5}{5} = 1$

$\mathbf{r}^{63} = \frac{4}{Max(4;2;4;5;5;4;3;4;4;5)} = \frac{4}{5} = 0{,}8$

$\mathbf{r}^{73} = \frac{3}{Max(4;2;4;5;5;4;3;4;4;5)} = \frac{3}{5} = 0{,}6$

$\mathbf{r}^{83} = \frac{4}{Max(4;2;4;5;5;4;3;4;4;5)} = \frac{4}{5} = 0{,}8$

$\mathbf{r}^{93} = \frac{4}{Max(4;2;4;5;5;4;3;4;4;5)} = \frac{4}{5} = 0{,}8$

$\mathbf{r}^{103} = \frac{5}{Max(4;2;4;5;5;4;3;4;4;5)} = \frac{5}{5} = 1$

d. Criteria C4 (Benefit)

$\mathbf{r}^{14} = \frac{4}{Max(4;3;4;5;4;5;3;4;5;5)} = \frac{4}{5} = 0{,}8$

$\mathbf{r}^{24} = \frac{3}{Max(4;3;4;5;4;5;3;4;5;5)} = \frac{3}{5} = 0{,}6$

$\mathbf{r}^{34} = \frac{4}{Max(4;3;4;5;4;5;3;4;5;5)} = \frac{4}{5} = 0{,}8$

$\mathbf{r}^{44} = \frac{5}{Max(4;3;4;5;4;5;3;4;5;5)} = \frac{5}{5} = 1$

$\mathbf{r}^{54} = \frac{4}{Max(4;3;4;5;4;5;3;4;5;5)} = \frac{4}{5} = 0{,}8$

$\mathbf{r}^{64} = \frac{5}{Max(4;3;4;5;4;5;3;4;5;5)} = \frac{5}{5} = 1$

$\mathbf{r}^{74} = \frac{3}{Max(4;3;4;5;4;5;3;4;5;5)} = \frac{3}{5} = 0{,}6$

$\mathbf{r}^{84} = \frac{4}{Max(4;3;4;5;4;5;3;4;5;5)} = \frac{4}{5} = 0{,}8$

$\mathbf{r}^{94} = \frac{5}{Max(4;3;4;5;4;5;3;4;5;5)} = \frac{5}{5} = 1$

$\mathbf{r}^{104} = \frac{5}{Max(4;3;4;5;4;5;3;4;5;5)} = \frac{5}{5} = 1$

e. Criteria C5 (Benefit)

$\mathbf{r}^{15} = \frac{4}{Max(4;3;4;5;5;4;4;4;4;5)} = \frac{4}{5} = 0{,}8$

$\mathbf{r}^{25} = \frac{3}{Max(4;3;4;5;5;4;4;4;4;5)} = \frac{3}{5} = 0{,}6$

$\mathbf{r}^{35} = \frac{4}{Max(4;3;4;5;5;4;4;4;4;5)} = \frac{4}{5} = 0{,}8$

$\mathbf{r}^{45} = \frac{5}{Max(4;3;4;5;5;4;4;4;4;5)} = \frac{5}{5} = 1$

$\mathbf{r}^{55} = \frac{5}{Max(4;3;4;5;5;4;4;4;4;5)} = \frac{5}{5} = 1$

$\mathbf{r}^{65} = \frac{4}{Max(4;3;4;5;5;4;4;4;4;5)} = \frac{4}{5} = 0{,}8$

$\mathbf{r}^{75} = \frac{4}{Max(4;3;4;5;5;4;4;4;4;5)} = \frac{4}{5} = 0{,}8$

$\mathbf{r}^{85} = \frac{4}{Max(4;3;4;5;5;4;4;4;4;5)} = \frac{4}{5} = 0{,}8$

$\mathbf{r}^{95} = \frac{4}{Max(4;3;4;5;5;4;4;4;4;5)} = \frac{4}{5} = 0{,}8$

$\mathbf{r}^{105} = \frac{5}{Max(4;3;4;5;5;4;4;4;4;5)} = \frac{5}{5} = 1$

Based on the results above, a normalization matrix can be created as follows:

Table 7. Matrix Normalization (R)

Alternative	Criteria				
	C1	C2	C3	C4	C5
Bambang	0,5	0,8	0,8	0,8	0,8
Aris	0,5	0,6	0,4	0,6	0,6
Agus	0,33	0,8	0,8	0,8	0,8
Siti	1	1	1	1	1
Marni	1	0,8	1	0,8	1
Sapto	1	1	0,8	1	0,8
Rudi	0,5	0,8	0,6	0,6	0,8
Agung	1	0,8	0,8	0,8	0,8
Wawan	1	0,8	0,8	1	0,8
Yuni	1	0,8	1	1	1

5) Calculation of relative preference values (Vector V) and Ranking
At this stage, the relative preference value is calculated by adding up all the normalization results of the criteria multiplied by the criteria weight value. The calculation can be stated like this:
A1 = ((0,5×0,1) + (0,8×0,2) + (0,8×0,2) + (0,8×0,2) + (0,8×0,3)) = 0,77
A2 = ((0,5×0,1) + (0,6×0,2) + (0,4×0,2) + (0,6×0,2) + (0,6×0,3)) = 0,55
A3 = ((0,33×0,1) + (0,8×0,2) + (0,8×0,2) + (0,8×0,2) + (0,8×0,3)) = 0,7533
A4 = ((1×0,1) + (1×0,2) + (1×0,2) + (1×0,2) + (1×0,3)) = 1
A5 = ((1×0,1) + (0,8×0,2) + (1×0,2) + (0,8×0,2) + (1×0,3)) = 0,92
A6 = ((1×0,1) + (1×0,2) + (0,8×0,2) + (1×0,2) + (0,8×0,3)) = 0,9
A7 = ((0,5×0,1) + (0,8×0,2) + (0,6×0,2) + (0,6×0,2) + (0,8×0,3)) = 0,69
A8 = ((1×0,1) + (0,8×0,2) + (0,8×0,2) + (0,8×0,2) + (0,8×0,3)) = 0,82
A9 = ((1×0,1) + (0,8×0,2) + (0,8×0,2) + (1×0,2) + (0,8×0,3)) = 0,89
A10 = ((1×0,1) + (0,8×0,2) + (1×0,2) + (1×0,2) + (1×0,3)) = 0,96

Table 8. Calculation Results of Relative Preference Values and Ranking

Alternative	Results	Results
Bambang	0,77	7
Aris	0,55	10
Agus	0,753333	8
Siti	1	1
Marni	0,92	3
Sapto	0,9	4
Rudi	0,69	9
Agung	0,82	6
Wawan	0,86	5
Yuni	0,96	2

3.3. Implementation of Weighted Products (WP)
Just like the SAW method, in system process analysis using the WP approach, a criteria weight value is required for each alternative. However, this method does not normalize the matrix, but instead calculates the value of the vector S. The following are the steps for implementing it:

1) Determination of the results of Vector S
The first step is to create a rank value based on the attribute. If the attribute is a benefit, the value 1 is used, and if the attribute is a cost, the value -1 is used:

$C_{1(Cost)}$ = 0,1 × (-1) = -0,1
$C_{2(\text{Benefit})}$ = 0,2 × 1 = 0,2
$C_{3(\text{Benefit})}$ = 0,2 × 1 = 0,2
$C_{4(\text{Benefit})}$ = 0,2 × 1 = 0,2
$C_{5(\text{Benefit})}$ = 0,3 × 1 = 0,3

Thus, the result is:

Table 9. Rank Values

Value	-0,1	0,2	0,2	0,2	0,3

Next, the resulting vector S is determined by multiplying each rank value times the attribute in Table 7:

S1 = $(2^{(-0,1)}) \times (4^{0,2}) \times (4^{0,2}) \times (4^{0,2}) \times (4^{0,3}) = 3{,}24901$
S2 = $(2^{(-0,1)}) \times (3^{0,2}) \times (2^{0,2}) \times (3^{0,2}) \times (3^{0,3}) = 2{,}312533$
S3 = $(3^{(-0,1)}) \times (4^{0,2}) \times (4^{0,2}) \times (4^{0,2}) \times (4^{0,3}) = 3{,}119909$
S4 = $(1^{(-0,1)}) \times (5^{0,2}) \times (5^{0,2}) \times (5^{0,2}) \times (5^{0,3}) = 4{,}2567$
S5 = $(1^{(-0,1)}) \times (4^{0,2}) \times (5^{0,2}) \times (4^{0,2}) \times (5^{0,3}) = 3{,}89322$
S6 = $(1^{(-0,1)}) \times (5^{0,2}) \times (4^{0,2}) \times (5^{0,2}) \times (4^{0,3}) = 3{,}807308$
S7 = $(2^{(-0,1)}) \times (4^{0,2}) \times (3^{0,2}) \times (3^{0,2}) \times (4^{0,3}) = 2{,}895846$
S8 = $(1^{(-0,1)}) \times (4^{0,2}) \times (4^{0,2}) \times (4^{0,2}) \times (4^{0,3}) = 3{,}482202$
S9 = $(1^{(-0,1)}) \times (4^{0,2}) \times (4^{0,2}) \times (5^{0,2}) \times (4^{0,3}) = 3{,}641128$
S10 = $(1^{(-0,1)}) \times (4^{0,2}) \times (5^{0,2}) \times (5^{0,2}) \times (5^{0,3}) = 4{,}070905$

Table 10. Vector S Results

Si	Value
S1	3,24901
S2	2,312533
S3	3,119909
S4	4,2567
S5	3,89322
S6	3,807308
S7	2,895846
S8	3,482202
S9	3,641128
S10	4,070905
ΣSi	34,72876

2) Calculation of Vector V and Ranking values

In this step, the calculation is carried out by dividing each Si by ΣSi :
V1 = 3,24901/34,72876 = 0,093554
V2 = 2,312533/34,72876 = 0,066588
V3 = 3,119909/34,72876 = 0,089836
V4 = 4,2567/34,72876 = 0,12257
V5 = 3,89322/34,72876 = 0,112104
V6 = 3,807308/34,72876 = 0,10963
V7 = 2,895846/34,72876 = 0,083385
V8 = 3,482202/34,72876 = 0,100269
V9 = 3,641128 /34,72876 = 0,104845
V10 = 4,070905/34,72876 = 0,11722

Table 11. Vector V and Ranking Results

Alternative	Results (Vi)	Ranking
Bambang	0,093554	7
Aris	0,066588	10
Agus	0,089836	8
Siti	0,12257	1
Marni	0,112104	3
Sapto	0,10963	4
Rudi	0,083385	9
Agung	0,100269	6
Wawan	0,104845	5
Yuni	0,11722	2

3.4 Web Page Implementation

In this phase, both methods are integrated into a website using PHP for employee selection. The website has two types of users: admin and user. The functionalities are Admin users can: Open job vacancies, evaluate and accept employees, manage data (add, view, update, delete). Regular users can: Add personal data for job applications, view and apply for jobs opened by the admin.

(a) Login Page (b) Admin Main Page (c) Employee Selection Page

Figure 2. App Web Page

Figure 2.a. Login Page shows the login page where users can log in as admin or user by entering their email and password. New users can register to use the web. Figure 2.b. Main Admin Page shows the Dashboard used by the admin to view job vacancy data, available applicants, number of applicants, and set criteria. Figure 2.c. Employee Selection Page accessible by the admin, allows viewing and editing job vacancy details, applicant data, and applicant calculation data processed with the SAW and WP approaches.

3.5 Discussion

In the previous section, we applied the Simple Additive Weight (SAW) method to evaluate the suitability of candidates for employment at Setrika Uap Tegar Mandiri. The SAW method provided transparency and objectivity by clearly defining criteria and their weights, allowing the organization to assign different weights based on relative importance. This data-driven approach reduced the likelihood of bias and enhanced precision, but it does have limitations, such as assuming criteria independence and sensitivity to weight changes. To further improve the employee selection process, Setrika Uap Tegar Mandiri can consider benchmarking selected candidates against actual job performance and continuously assessing and adapting selection criteria for optimal decision-making.

4. Related Work

In conducting this research, we referred to several related studies that had been carried out to identify problems related to job vacancy information using various methods. Naramessakh & Prianto's research discusses how to determine potential microloan recipients based on the criteria set by PT. Indonesian post. They use the Weighted Product (WP) method and collect data through observation and interviews with loan applicants. The results of their research have proven the ability of this method in determining alternative loan recipients based on predetermined abilities and qualities, with the aim that PT. Pos Indonesia to identify potential customers quickly, simply, and efficiently. However, the limitation of this research is that the calculations are still carried out manually, and there needs to be further development in the form of an application to calculate selection criteria directly in a decision support system [4]. Marbun *et al*. also applied the Weighted Product (WP) method in selecting the best investigators at the Deli Serdang Police Narcotics SAT. The WP approach they implemented produced the best ranking proposal, with E. Lumbantoruan obtaining the top ranking [5].

Research conducted by Ferdian F applied the Simple Additive Weighting (SAW) method in selecting new Ceria TV employees. Qualification standards that are taken into consideration in employee selection include age, highest level of education, work experience, interview results, and skills, each of which has its own weight. The research results show that Afdhal Maswar has the highest preference value. Additionally, when tested, all system functions ran smoothly, achieving 100% efficiency. Furthermore, testing using the User Acceptability Test (UAT) approach showed an extraordinary level of system acceptance, reaching 89% [6]. Nurlela *et al*. used quantitative techniques to find out the most preferred majors at Sirajul Falah Vocational School by applying the SAW method and comparing different factors with each other. This research uses quantitative data from each vocational school major, such as grades, extracurricular activities, competence, creativity, and performance. The results determined that the accounting major was the most popular at Sirajul Falah Vocational School based on calculations [7]. Maulana *et al*. discussing the recruitment of prospective employees at Hyfresh Blitar by comparing the SAW and WP approaches. They use PHP to enter certain parameters such as experience, age, education, psychosis, and interviews. They calculated weights and eight criteria to assess the accuracy of the SAW and WP procedures, then compared the best results. Research findings can be implemented effectively; The success rate for the SAW method was 96.5%, while the WP method reached 81%. Based on test results, the Simple Additive Weighting (SAW) approach with an accuracy rate of 96.5% was proven to be more effective in ensuring employee recruitment [8]. All this research uses evaluation methods in various contexts, whether in the selection of loan recipients, investigators, employees, or education majors. However, each method has its own strengths and weaknesses, and developing technology to automate calculations is an important aspect that needs to be considered to increase efficiency and effectiveness in decision making.

5. Conclusion

In conclusion, the research and discussion comparing the Simple Additive Weight (SAW) and Weighted Product (WP) methods for employee selection in the "Tegar Mandiri" steam iron company have provided valuable insights. The current situation at the company lacks an efficient system for recruiting new employees, leading to various challenges such as direct applicant visits and manual registration processes prone to data damage. However, the proposed decision support system addresses these issues by allowing applicants to view job vacancies and register online, while administrators can efficiently process applicant data. Furthermore, the comparison between the SAW and WP methods favored the SAW method, with an accuracy rate of 96%. The SAW method's advantage in normalizing data and handling differences in criteria scales and units makes it a more accurate and dominant choice for employee selection priorities. Therefore, implementing the SAW-based decision support system is expected to streamline and improve the employee recruitment process at "Tegar Mandiri" and similar companies, enhancing overall efficiency and effectiveness.

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