Design of A Decision Support System for Employee Recruitment Using the Simple Additive Weighting (SAW) Method Based on Java

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Abstract

This system is designed to create a Decision Support System (DSS) that effectively and efficiently aids in the employee selection and recruitment process at PT. XYZ using the Simple Additive Weighting (SAW) method, implemented in Java. The system supports the company in selecting and hiring employees based on specific criteria. The research involves collecting data through surveys and interviews with relevant stakeholders. The collected data is analyzed using the SAW method, which is chosen for its ability to deliver accurate and easy- to-understand decision-making outcomes by aggregating the weights of each normalized criterion. The system is developed using Java NetBeans, which simplifies the design process of this decision support system. The research findings indicate that the system is capable of providing effective and accurate recommendations for employee selection at PT. XYZ. It evaluates candidates based on relevant criteria, such as skills, experience, and other qualifications aligned with the company's requirements. Additionally, the system organizes and securely stores data related to these criteria in its database.

***Keywords**: Decision Support System, Simple Additive Weighting (SAW), Employee Recruitment, Java*

1. INTRODUCTION

The recruitment process is a vital part of a company's business operations, as selecting the right employees ensures the company has a skilled workforce that meets organizational needs and contributes to achieving its vision and mission. The recruitment and selection process helps build a pool of candidates and identifies the most suitable individuals to contribute to positive organizational outcomes (Muduli & Trivedi, 2020). Recruitment involves finding employees whose abilities match the qualifications and

needs of a company or organization (Nurul & Angelia, 2018). As a result, many companies conduct recruitment with selection tests based on specific criteria established by the company.

At PT. XYZ, there is a need for a decision support system to streamline the recruitment and selection of employees effectively and efficiently. Decision support systems (DSS) are tools that address problems across various fields and support effective decision-making (Ali et al., 2023). These systems provide structured, relevant, and suitable information to assist decision-makers (Sarwandi, 2023).

Utilizing the Simple Additive Weighting (SAW) method, which is a multi-attribute approach based on the concept of weighted summation, this method calculates the performance suitability of each alternative across all attributes. The alternative with the highest value is recommended (Rizka & Sari, 2023). The SAW method requires first determining the weights for each attribute (Saputra & Aprilian, 2020). It involves defining criteria, assigning ratings, creating a matrix, and performing normalization (Resti, 2017).

This system is developed using the *Java* programming language and implemented through *NetBeans* software. An information system is a structured set of formal procedures that organize and process data into information, which is then communicated to users (Kadir, 2014). Java is a versatile programming language that runs on various operating systems, including mobile devices. As an evolution of *C++, Java* is now one of the most popular programming languages, widely used for developing a variety of application software and web-based applications (Harumy, et al., 2018). *NetBeans*, an Integrated Development Environment (IDE) built with Java, offers an integrated development environment that includes features for GUI development, text editing, compiling, and interpreting. As open-source software, NetBeans is freely available for both commercial and non-commercial use, with support from Sun Microsystems (Rusmayanti, 2014).

In conclusion, this decision support system can effectively and efficiently assist PT. XYZ in recommending the best candidates during the recruitment process. By applying the Simple Additive Weighting (SAW) method, the system calculates rankings based on predefined criteria weights, ensuring accurate results that meet the company's needs.

Relevant Research

Table.1 Relevant Research

No	Researcher (Year)	Research Title	Method	Research Result
1	M. Fadilah Fahrurrozi (2023)	Election of Student Council Chairperson at SMK Al Hidayah 1 Jakarta	Simple Additive Weighting (SAW)	The system was tested by the school and was deemed effective, producing more efficient and accurate decisions, which assisted the school in selecting the OSIS chairman.
2	Dendy Al Hakim (2023)	Employee Recruitment Remains at PT. Libra Mandiri Sejahtera	Simple Additive Weighting (SAW)	By using the Simple Additive Weighting (SAW) method and the Waterfall model, decision-making regarding the selection of culinary venues can be facilitated according to preferences.
3	Novianto & Winiarti, (2019)	w Employee Selection	Simple Additive Weighting (SAW)	The research results in a Decision Support System software for employee selection using the SAW method, based on a web platform, which can provide results from the assessment conducted on each job candidate.
4	Afrisawati, (2019)	ıployee Recruitment at STMIK Royal	Simple Additive Weighting (SAW)	A system that uses the Simple Additive Weighting (SAW) method can provide alternatives and expedite calculations in the employee recruitment process. The final result of this research is the best alternative for employee recruitment at STMIK Royal.

Source : Private Document (2024)

2. METHOD

This research was conducted at PT. XYZ from March to July. The research

followed several stages, including problem formulation, decision study, data collection, problem-solving analysis, algorithm implementation, and conclusion drawing. The algorithm used in this study is the Simple Additive Weighting (SAW) algorithm, which is a decision-making method that utilizes multiple criteria.

3. RESULTS AND DISCUSSION

Algorithm Discussion

An algorithm is a systematic approach defined by a finite sequence of steps (Maulana, 2017). The algorithm used to make decisions in this decision support system is the Simple Additive Weighting (SAW) algorithm. In the Simple Additive Weighting (SAW) calculation process, three alternatives are used with the following eight criteria:

Table 2. Criteria List Table

No	Kriteria	Keterangan
1	Asal Perguruan Tinggi	*C1*
2	Jenjang Pendidikan	*C2*
3	IPK	*C3*
4	Sertifikasi	*C4*
5	Usia	*C5*
6	Pengalaman	*C6*
7	Organisasi	*C7*
8	TOEFL	*C8*

Source : Private Document (2024)

Based on the predetermined criteria, each criterion has a percentage of the level of importance of the criteria, as follows:
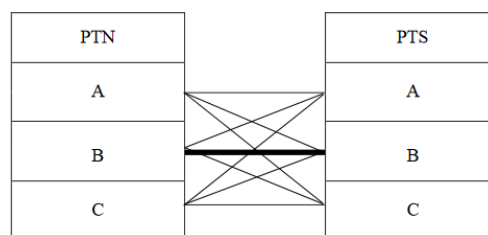

Figure 1. Criteria Value Weight (Private Document 2024) Table 3. Criteria Weighting

No	Kriteria	Keterangan
1	Asal Perguruan Tinggi	30%
2	Jenjang Pendidikan	6%
3	IPK	25%
4	Sertifikasi	5%
5	Usia	3%
6	Pengalaman	3%
7	Organisasi	3%

8	TOEFL	25%

Source : Private Document (2024)

From the data criteria above, which are considered important in determining employee composition, the criterion of the origin of the higher education institution has an importance value of 30% and is differentiated based on the accreditation value of the originating higher education institution. The following are the weights for the origin of the higher education institution criterion and the obtained comparison as follows:

- APTN – APTS = APTN
- APTN – BPTS = APTN
- APTN – CPTS = APTN
- BPTN – APTS = APTS
- BPTN – BPTS = BPTN
- BPTN – CPTS = BPTN
- CPTN – APTS = APTS
- CPTN – BPTS = BPTS
- CPTN – CPTS = CPTN

So, the value weight for the college origin criteria is:

Table 4. Weight of Value Criteria of Origin of Higher Education Institution

Akreditasi Perguruan Tinggi	Nilai
CPTS	0
CPTN	20
BPTS	40
BPTN	60
APTS	80
APTN	100

Source: Private Document (2024)

The education level criterion has an importance value of 6%, where applicants with a higher level of education will receive a higher score.

Table 5. Weight of Value Criteria for Education Level

Akreditasi Perguruan Tinggi	Nilai
D3	25
S1	50
S2	100

Source : Private Document (2024)

The Cumulative Grade Point Average (GPA) criterion has an importance level of 25%, indicating that applicants with a higher GPA will receive a higher score.

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Table 6. GPA criteria value weighting

IPK	Nilai
PTS IPK>=2.75 X IPK<3.00	0
PTN IPK>=2.75 X IPK<3.00	20
PTS IPK>=3.00 X IPK<3.50	40
PTN IPK>=3.00 X IPK<3.50	60
PTS IPK>=3.50	80
PTN IPK>=3.50	100

Source: Private Document (2024)

The Certification Criteria have an importance level of 5%, as follows:

Table 7. Certification Criteria Value Weighting

Sertifikasi	Nilai
Tidak Ada	0
Ada	100

Source: Private Document (2024)

The age criteria has an importance value of 3%, as follows:

Table 8. Age Criteria Value Weight

Usia	Nilai
Usia < 20 X Usia > 28	0
Usia == 28	20
Usia == 26 X Usia == 27	40
Usia == 24 X Usia == 25	60
Usia == 23 X Usia == 24	80
Usia == 20 X Usia == 22	100

Source : Private Document (2024)

The criteria for work experience and organization have an importance of 3%, as follows:

Table 9. Table of values for work experience and organizational criteria

Pengalaman Kerja/Organisasi	Nilai
Tidak Ada	0
Ada	100

Source : Private Document (2024)

The foreign language proficiency criteria have a 25% advantage. They are as follows:

Table 10. TOEFL Criteria Score Weighting

Nilai TOEFL	Nilai
Nilai <450	0
Nilai >= 450 X Nilai <475	20
Nilai >= 475 X Nilai <500	40
Nilai >= 500 X Nilai <525	60

Nilai >= 525 X Nilai <550	80
Nilai >= 550	100

Source : Private Document (2024)

List alternative assessments against each criterion.

Table 11. List of Alternative Assessments for Each Criteria

Alternatif	Kriteria								Total
	C1	*C2*	*C3*	*C4*	*C5*	*C6*	*C7*	*C8*	Nilai
A	40	50	40	0	60	100	100	0	390
B	100	50	60	100	60	0	100	60	530
C	100	50	20	100	60	100	100	80	610

Source : Private Document (2024)

The normalization results table of preferences.

Table 12. Table of preference result values

Alternatif	Kriteria							
	C1	*C2*	*C3*	*C4*	*C5*	*C6*	*C7*	*C8*
A	12	6	16,67	0	3	3	3	0
B	30	6	25	5	3	0	3	18,75
C	30	6	8,33	5	3	3	3	25

Source : Private Document (2024)

After adding up the preference values, the final value of the SAW method calculation can be obtained.

Table 13. Final Score

Alternatif	**Nilai**
A	43,666667
B	90,75
C	83,3333

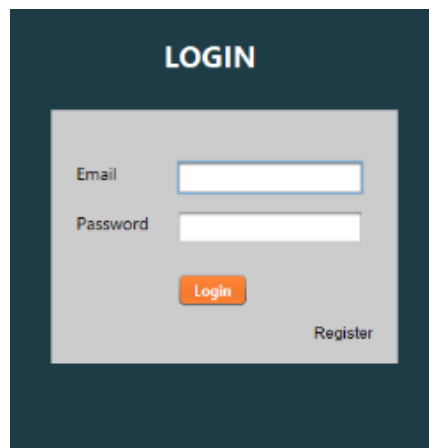**Source** : Private Document (2024)

Screen Display

Figure 2. Screen Display *Form Login*

The login screen is the interface displayed before the user can access the main menu. Here, users are prompted to enter their registered email and password, which they previously set up during the registration process. After entering their email and password, users can click the login button to proceed to the main menu.

Figure 3. Screen Display *Form* Menu

The profile screen on the main menu is a feature that allows users to view and manage their data. In this screen, users can view their profile and access several other useful features within the application.
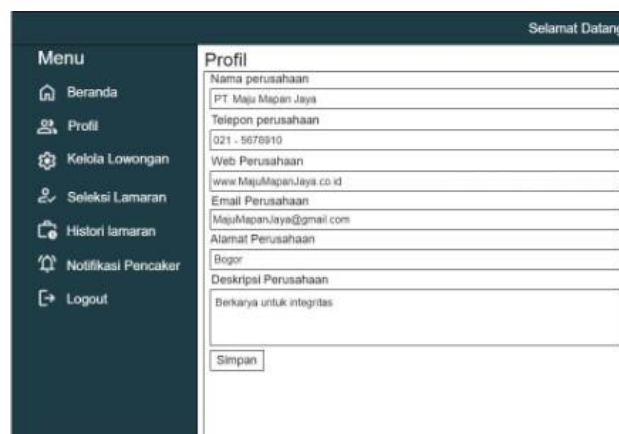

Figure 4. Screen Display *Profile*

This screen serves as a dedicated space for viewing company information. It not only provides users with essential details about the company but also offers the functionality to update or modify the existing information as needed. This feature ensures that the company's data remains accurate and up-to-date, reflecting any changes or improvements made over time.

Figure 5. Manage Vacancies Screen View

This screen displays a complete list of job openings currently available at the company. In this menu, recruiters can add new job postings by entering the required information. Additionally, recruiters can review and manage the existing job listings, ensuring that all available opportunities are accurately represented and up-to-date.

Figure 6. Vacancy Selection Screen View

This screen displays various job applications received by the company. Here, recruiters can make decisions about which applicants will be accepted or rejected by using the buttons located at the top of the table. Recruiters can review the applications and decide which candidates to accept or decline by simply pressing the appropriate buttons at the top of the table.

Figure 7. Application History Screen View

This screen displays the applications that have been received and processed by the recruiter. On this menu, the recruiter can generate and print detailed reports regarding the outcomes of the employee selection process. These reports provide comprehensive information about each application, including evaluation results and final decisions. The ability to print these reports allows the recruiter to keep physical records and review the selection outcomes thoroughly.

Figure 8. Report Screen View

The screen display of this report presents a printed report of accepted applicants, derived from the data available in the application history menu. In this view, users can see the complete details of the report, including information about the applicants who have been successfully accepted by the company. This display allows users to easily review and print reports for the company's administrative needs.

4. CONCLUSION

In this study, it can be concluded that the development of a decision support system for employee recruitment at PT.XYZ is expected to yield the desired benefits. This system allows the assessment of prospective employees based on relevant criteria, such as skills, experience, and other qualifications that match the company's needs. The evaluation results show that the SAW system can be relied on to support the employee selection process, because it is able to provide consistent and accurate results according to the established criteria. Thus, this system is expected to improve efficiency and objectivity in the recruitment process at PT. XYZ.

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