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Design of a Web-Based Decision Support System to Determine the Study Program for New Students at the Faculty of Technology, Battuta University

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ABSTRACT

The admission of new students at the Faculty of Technology, Universitas Battuta faces challenges in placing students in study programs that align with their potential, interests, and talents. The placement process, often conducted manually, can result in mismatches between students and their chosen programs, negatively impacting academic performance and student satisfaction. This study aims to design and develop a web-based Decision Support System (DSS) using the SAW method. The research findings indicate that this DSS is effective in determining study programs by considering three normalized criteria. The system successfully provides accurate recommendations for new students, thereby reducing subjectivity and enhancing the accuracy of student placement.

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1. INTRODUCTION

New student admission is an important process in higher education, including Battuta University's Faculty of Technology. The main challenge is to place students in study programs that match their potential, interests, and talents. This placement process is often done manually or subjectively, which can lead to a mismatch between students and the chosen study program, impacting academic performance, satisfaction, and faculty efficiency. A web-based Decision Support System (DSS) is expected to be a solution in determining the right study program for new students, improving the match between students and study programs (Marbun & Seng, 2019). [1]

Related research shows the effectiveness of SPK in determining majors. Siti et al. (2023) found that DSS based on the SAW method at SMK Manunggal helped organize new student data and select majors based on appropriate criteria. [2] Satria (2020) also concluded that web-based DSS with the SAW method at SMA Negeri 1 Pontianak increased the efficiency and accuracy of determining majors. [3]

At Battuta University's Faculty of Technology, the mismatch of majors is also caused by the lack of information on the profile of graduates from each study program, such as competencies, career opportunities, and job prospects. This causes students to feel incompatible with academic and work demands, resulting in decreased motivation to learn, achievement, and even the desire to change majors. This problem also has an impact on faculty operations that must handle changes in majors. This research aims to design and develop a

web-based DSS to help Battuta University's Faculty of Technology determine suitable study programs for new students.

2. METHOD

Decision Support System (DSS) is an information system used to assist decision making in an organization or company, DSS is designed to facilitate complex decision making processes by providing structured and relevant information. [4]

In this research stage, the decision support system for selecting study programs using the SAW method is developed using the waterfall system development method. The waterfall method is also called the linear sequential method or classic life cycle which is one of the models in SDLC (System Development Life Cycle) based development. One of the references used in this research is to conclude that DSS with the SAW method at PT Technology Laboratories Indonesia increases efficiency, transparency, and objectivity in the new employee selection process. [5]

Data collection is done through several techniques. First, a literature study was conducted to collect and review relevant literature regarding decision support systems, study program selection methods, and web technology. Second, interviews were conducted with education experts and lecturers at the Faculty of Technology to gain insight into the important factors in study program selection. Finally, direct observation in the Faculty of Technology environment was conducted to understand the existing registration and study program selection process.

In database design, it is important to ensure an efficient and consistent structure. Normalization techniques are used to eliminate redundancy and ensure data integrity, while Entity Relationship Diagram (ERD) helps visualize the relationships between tables. The following is a clearly designed database structure, including the main tables and their attributes to meet the needs of the system.

3. RESULTS AND DISCUSSION

3.1. Discussion of SAW Method Calculation

In the case study of determining new student study programs at the Faculty of Technology, Battuta University, there are 3 criteria used with the weight of each criterion as follows:

Table 1. Table of Criteria and Weights used

Criteria Name	Criteria Definition	Criteria Weight
C1	Academic Ability Test Score	25 %
C2	Specialization Test Score	40 %
C3	Technology Proficiency Test Score	35 %

There are 5 people who are participants who are candidates (alternatives) in determining the study program for new students of the Faculty of Technology, Battuta University, the following is a table of alternative values in each criterion:

Table 2. Alternative Value for Each Criterion

Alternative	Criteria								
	C1			C2			C3		
	IF	SI	TI	IF	SI	TI	IF	SI	TI
Ruth	20	80	80	60	60	80	100	40	20
Dina	60	100	80	40	80	60	40	80	80
Adel	40	100	100	80	100	60	40	100	60
Rizky	80	60	80	80	60	100	20	40	40
Rudi	100	100	20	80	60	100	100	80	60

Perform normalization for each criterion:
Maximum Value for Each Criterion:
C1 (IF) with maximum value = 100
C1 (SI) with maximum value = 100
C1 (IT) with maximum value = 100
C2 (IF) with maximum value = 80
C2 (SI) with maximum value = 100
C2 (IT) with maximum value = 100

C3 (IF) with maximum value = 100
C3 (SI) with maximum value = 100
C3 (IT) with maximum value = 80

Table 3. Criteria Normalization Table

Alternative	C1			C2			C3		
	IF	SI	TI	IF	SI	TI	IF	SI	TI
A1	$\frac{20}{100}=0.2$	$\frac{80}{100}=0.8$	$\frac{80}{100}=0.8$	$\frac{60}{80}=0.75$	$\frac{60}{100}=0.6$	$\frac{80}{100}=0.8$	$\frac{100}{100}=1.0$	$\frac{40}{100}=0.4$	$\frac{20}{80}=0.25$
A2	$\frac{60}{100}=0.6$	$\frac{100}{100}=1.0$	$\frac{80}{100}=0.8$	$\frac{40}{80}=0.5$	$\frac{80}{100}=0.8$	$\frac{60}{100}=0.6$	$\frac{40}{100}=0.4$	$\frac{80}{100}=0.8$	$\frac{80}{80}=1.0$
A3	$\frac{40}{100}=0.4$	$\frac{100}{100}=1.0$	$\frac{100}{100}=1.0$	$\frac{80}{80}=1.0$	$\frac{100}{100}=1.0$	$\frac{60}{100}=0.6$	$\frac{40}{100}=0.4$	$\frac{100}{100}=1.0$	$\frac{60}{80}=0.75$
A4	$\frac{80}{100}=0.8$	$\frac{60}{100}=0.6$	$\frac{80}{100}=0.8$	$\frac{80}{80}=1.0$	$\frac{60}{100}=0.6$	$\frac{100}{100}=1.0$	$\frac{20}{100}=0.2$	$\frac{40}{100}=0.4$	$\frac{40}{80}=0.5$
A5	$\frac{100}{100}=1.0$	$\frac{100}{100}=1.0$	$\frac{20}{100}=0.2$	$\frac{80}{80}=1.0$	$\frac{60}{100}=0.6$	$\frac{100}{100}=1.0$	$\frac{100}{100}=1.0$	$\frac{80}{100}=0.8$	$\frac{60}{80}=0.75$

After normalizing, each value is multiplied by the weight of each criterion, then summed. The results obtained are as follows:
V1

(IF): (0.2 × 0.25) + (0.75 × 0.4) + (1 × 0.35) = 0.05 + 0.3 + 0.35 = 0.7

(SI): (0.8 × 0.25) + (0.6 × 0.4) + (0.4 × 0.35) = 0.2 + 0.24 + 0.14 = 0.58

(TI): (0.8 × 0.25) + (0.8 × 0.4) + (0.25 × 0.35) = 0.2 + 0.32 + 0.0875 = 0.6075

V2

(IF): (0.6 × 0.25) + (0.5 × 0.4) + (0.4 × 0.35) = 0.15 + 0.2 + 0.14 = 0.49

(SI): (1 × 0.25) + (0.8 × 0.4) + (0.8 × 0.35) = 0.25 + 0.32 + 0.28 = 0.85

(TI): (0.8 × 0.25) + (0.6 × 0.4) + (1 × 0.35) = 0.2 + 0.24 + 0.35 = 0.79

V3

(IF): (0.6 × 0.25) + (0.5 × 0.4) + (0.4 × 0.35) = 0.15 + 0.2 + 0.14 = 0.49

(SI): (1 × 0.25) + (0.8 × 0.4) + (0.8 × 0.35) = 0.25 + 0.32 + 0.28 = 0.85

(TI): (0.8 × 0.25) + (0.6 × 0.4) + (1 × 0.35) = 0.2 + 0.24 + 0.35 = 0.79

V4
(IF): (0.8 × 0.25) + (1 × 0.4) + (0.2 × 0.35) = 0.2 + 0.4 + 0.07 = 0.67

(SI): (0.6 × 0.25) + (0.6 × 0.4) + (0.4 × 0.35) = 0.15 + 0.24 + 0.14 = 0.53

(TI): (0.8 × 0.25) + (1 × 0.4) + (0.5 × 0.35) = 0.2 + 0.4 + 0.175 = 0.775

V5
(IF): (1 × 0.25) + (1 × 0.4) + (1 × 0.35) = 0.25 + 0.4 + 0.35 = 1.0

(SI): (1 × 0.25) + (0.6 × 0.4) + (0.8 × 0.35) = 0.25 + 0.24 + 0.28 = 0.77

(TI): (0.2 × 0.25) + (1 × 0.4) + (0.75 × 0.35) = 0.05 + 0.4 + 0.2625 = 0.7125

Based on the total score obtained, each individual is categorized into the appropriate study program according to the score range that has been obtained:

Table 4. Table of Final Results and Recommended Study Programs

Alternative	Highest value	Recommended Study Program
A1	0.7	Informatika
A2	0.85	Sistem Informasi
A3	0.85	Sistem Informasi
A4	0.775	Teknologi Informasi
A5	1.0	Informatika

3.2 Program Interface

1. Login Page

This page is the initial page before entering the main page, here the *admin/user* must enter the username and password first in order to enter the main page.

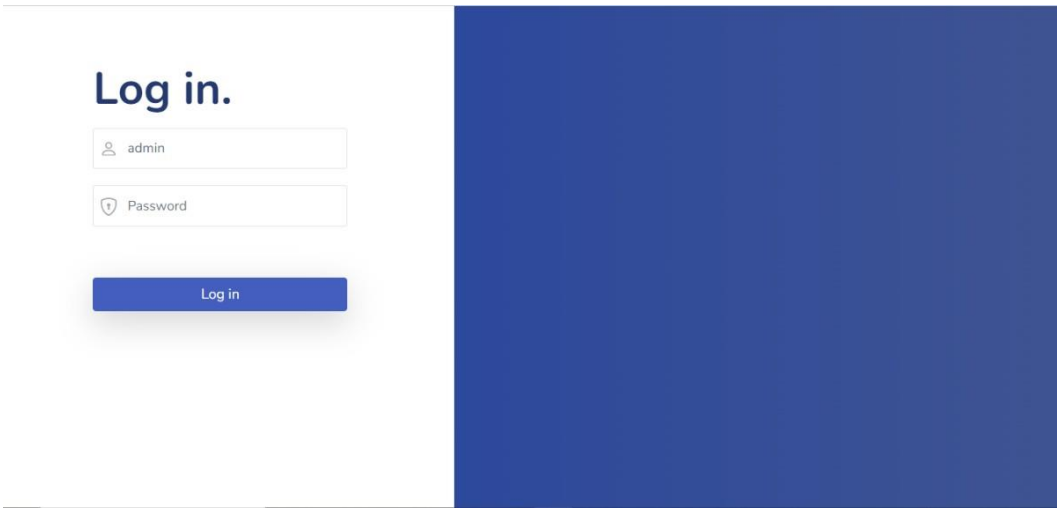

Figure 1. Login Page

2. Dashboard

The dashboard page contains a brief introduction of Battuta University Faculty of Technology and containsoptions such as student data, alternatives, weights and criteria, matrices, and preference values

Figure 2. Admin Dashboard Page

3.Student Alternative Data
This page allows the admin to add, edit, and delete student alternate data. The data displayed includes student names and test scores.
4. Weight and Criteria Management
Admin can view and change the criteria and weights used in the SAW calculation process.

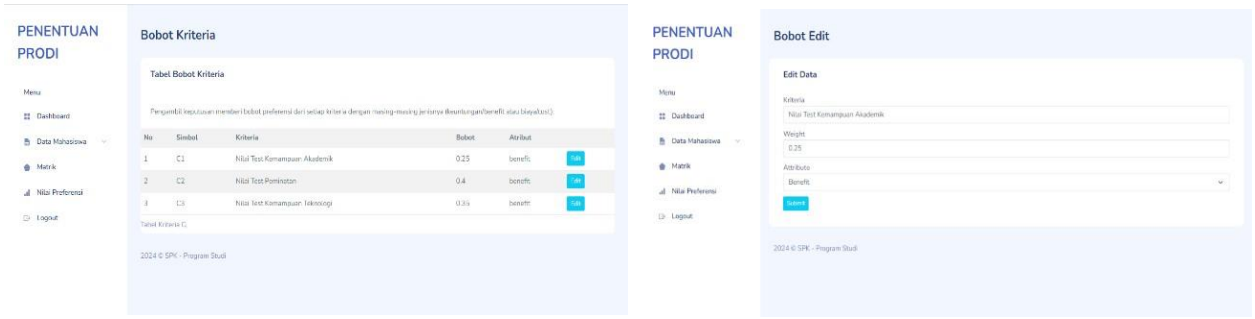

Figure 3. Criteria Weight Page and Edit Criteria Page

5.Calculation Matrix Page
Displays the results of SAW calculations in the form of a table showing the calculation of the decision matrix and the results of the normalized matrix.

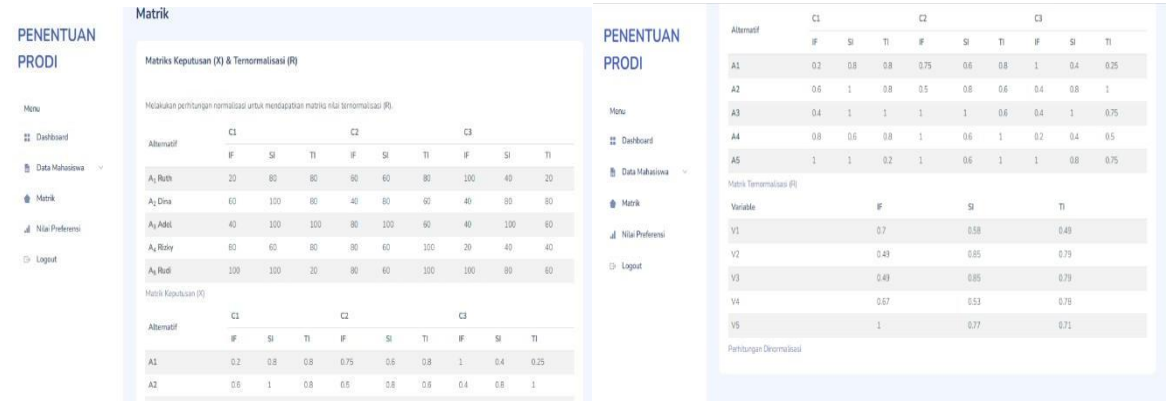

Figure 4. Matrix Page

6.Preference Value Page
Displays the final results of all calculations in tabular form.

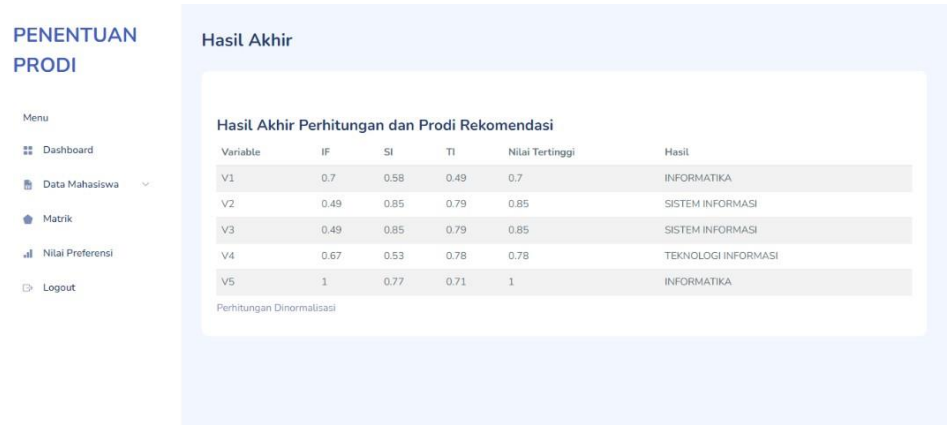

Figure 5. Preference Value Page

4. CONCLUSION

Based on the results of the research and discussion, it is concluded as follows:

1. The application of a decision support system using the SAW method has succeeded in helping determine new student study programs at the Faculty of Technology, Battuta University, facilitating assessment by integrating the values of several predetermined criteria and weights, so that decisions are more objective and accurate.
2. The assessment uses three normalized criteria to ensure a fair comparison between candidates, with normalization done by dividing the value of each candidate by the maximum value of each criterion.
3. The calculation results of the SAW method show the following study program recommendations:
    a. Ruth with the highest score of 0.7, recommended Informatics.
    b. Dina with the highest score of 0.85, suggested Information Systems.
    c. Adel with the highest score of 0.85, suggested Information Systems.
    d. Rizky with highest score 0.775, suggested Information System.
    e. Rudi with highest score 1.0, suggested Informatics.

REFERENCES

[1] E. Marbun and H. Seng, "Sistem Pendukung Keputusan Pemilihan Program Studi," *ILKOM Jurnal Ilmiah*, vol. 3, pp. 2-9, 2019.

[2] S. Suryani, E. S. Marsiani, and E. A. R. Pinahayu, "Sistem Pendukung Keputusan Menentukan Jurusan Siswa Baru Pada SMK Manunggal Menggunakan Metode SAW," *JRKT (Jurnal Rekayasa Komputasi Terapan)*, vol. 3, no. 3, pp. 136-142, 2023.

[3] B. Satria, "Sistem Pendukung Keputusan Penentuan Jurusan Menggunakan Metode SAW pada Siswa SMA Negeri 1 Pontianak," 2020.

[4] P. Heny, *Tujuan dan Karakteristik SPK*, pp. 6-8, 2020.

[5] F. Ruziq and M. R. Wayahdi, "Sistem Pendukung Keputusan Seleksi Karyawan Baru dengan Simple Additive Weighting pada PT. Technology Laboratories Indonesia," *Jurnal Minfo Polgan*, vol. 11, no. 2, pp. 153-159, 2022.