DECISION SUPPORT SYSTEM APPLICATION FOR STUDENT INFORMATION SYSTEMS IN HARAPAN UNIVERSITAS MEDAN USING WP METHOD

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ABSTRACT (10 PT, Bolt)

Decision making has an important influence on the progress or progress of an organization. The right decisions will make changes in the organization for the better, while the wrong decisions will have a bad impact on the organization and its governance. In the Information Systems study program, Universitas Harapan Medan there are 3 areas of specialization, namely: System Analysis, Information Management and Intelligent Information Systems. The system of specialization for students of the Information Systems study program at Universitas Harapan Medan is carried out by using a google form as a medium to collect answers from students who will take the field of specialization. This of course is considered less efficient, because to answer these questions students can find them through search engines such as google. So that some of the obstacles that may occur are the number of interests that are not in accordance with students, and errors in determining student specialization will also affect the quality of graduates. For this reason, an application of the right student specialization decision support system is needed to assist in the selection of specializations according to their abilities and interests. This decision support system application will be based on a website and built using the laravel framework. The method that will be used is the Weighted Product (WP) method with the value of the course as an assessment **Keyword : Decision Support System, Specialization, WP**

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1.   INTRODUCTION (10 PT)

Decision making is part of our daily lives, both individually and in groups, especially in an organization. Decision making has an important influence on the progress or decline of an organization. The right decision will make changes in the organization for the better, while the wrong decision will have a negative impact on the organization and its governance.Decision makers must be able to carry out the decision-making process and be able to delegate well. Decision making also requires skills ranging from gathering information, finding alternative decisions, choosing decisions, to facing the consequences of decisions that have been made.In the Information Systems study program at Harapan University, Medan, there are 3 areas of interest, namely: Systems Analysis, Information Management and Intelligent Information Systems.This area of expertise is one of the facilities offered by the Information Systems study program to help students deepen their abilities and skills in certain fields according to their potential, so that they can be developed optimally. Each student is required to choose 1 field of specialization and this choice of field of specialization is implemented when the student has entered level III of the study period.The system for determining the field of specialization for students in the Information Systems study program at Harapan University, Medan, is carried out by using Google forms as a medium for collecting answers from students who will take the field of specialization. This is of course considered less efficient, because to answer these questions students can search through search engines such as Google. This causes several obstacles, including determining interests that are not in accordance with student competencies, and errors in determining student interests will also affect the quality of graduates.For this reason, an appropriate student specialization decision support system application is needed to assist in selecting specializations that suit their abilities and interests. So a Decision Support System is used which can help in producing a decision from analysis of election data

specialization with criteria as considerations in the calculation process. A Decision Support System is a system that has the ability to solve complex problems that produce solutions. This system is useful in

making decisions in structured and unstructured situations where it is difficult to determine the outcome of the decision made with certainty (Lestari, Y. D., & Perdana, A., 2020). To implement a decision support system application in determining the area of interest of students majoring in Information Systems at Harapan University, Medan, a method is used, namely the Weighted Product (WP) method. The Weighted Product method is a method for determining a decision by multiplying to connect attribute ratings, where the rating of each attribute must first be raised to the power of the weight of the attribute concerned (Rikky Wisnu Nugraha and Farah Rasyidah, 2019). Through this research, a Decision Support System Application for Student Specialization Information Systems at Harapan University, Medan will be built using the WP Method to make it easier for the information systems study program to determine students' areas of specialization to make it more effective and efficient. This decision support system application will be website-based and built using the Laravel framework..

2.   RESEARCH METHOD

2.1 Software Development Methods

The method used to analyze, design and implement the system in this research is the Rapid Application Development (RAD) method. The RAD method is a system development method that is known to produce faster work with higher quality compared to other system development methods. The stages carried out by researchers are:

1. Requirements Planning

This stage is the initial stage where problem identification and data collection are carried out with the aim of identifying the final goal of the system to be built. To achieve this goal, data was collected that could help build a decision support system for students specializing in Information Systems at Harapan University, Medan. After knowing what is needed by the system, it is proposed that a new system will be built to replace the system previously used in the Information Systems Study Program at Harapan University, Medan.

2. Design Workshop

This stage aims to design a new system that will be used in the process of determining the field of specialization of students at the Information Systems Study Program at Harapan Medan University. System modeling will be carried out using the Unified Modeling Language (UML) which consists of use case diagrams, activity diagrams, sequence diagrams and class diagrams. Meanwhile, the interface design will be designed using Figma.

3. Implementation

At this stage, the follow-up to the design that has been made will be explained so that the system can run well. Implementation is also the stage of implementing an information system that has been completed by conducting trials on the new system. This stage includes two processes, namely:

•   Coding or programming, at this stage the design results are converted into programming language, namely using the Laravel Framework

•   Testing, at this stage a trial is carried out using the black box testing method to find out whether the running system is as desired or not.

Metode Weighted Product (WP)

Pada penelitian ini, metode weighted product (WP) digunakan untuk melakukan perankingan dan menentukan bidang peminatan mahasiswa dengan mempertimbangkan kriteria dan bobot. Metode weighted product (WP) menggunakan perkalian untuk menghubungkan nilai kriteria, yang dimana nilai untuk setiap kriteria harus dipangkatkan terlebih dahulu dengan bobot kriteria yang bersangkutan. Terdapat 3 alternatif yang menentukan peminatan apa yang paling sesuai terhadap masing-masing mahasiswa, yaitu: Table 1 Alternatif Peminatan

Alternatif	Keterangan
P1	Analisis Sistem

P2	Manajemen Informasi
P3	Sistem Informasi Cerdas

The steps for completing the wp method are as follows:

1. Determine criteria

   The criteria that will be used as a reference are elective courses from semester 1 to semester 4, as shown in the following table:

Table 2 Kriteria

Kriteria	Keterangan
C1	Bahasa Pemrograman
C2	Tata kelola teknologi informasi
C3	Sistem dan Teknologi Sistem Informasi
C4	Organisasi dan Manajemen
C5	Pangkalan Data
C6	Analisis dan Perancangan Sistem Informasi
C7	Sistem Operasi
C8	Analisis Proses Bisnis
C9	Struktur Data
C10	Komunikasi Antar Personal
C11	Pemrograman Berorientasi Objek
C12	Perancangan Dan Pengelolaan Jarkom
C13	Probabilistik Dan Statistik
C14	Pemrograman Berbasis Web
C15	Kecerdasan Buatan

2. Determine the initial weight

Initial weight is assessed with a number 1 to 3, namely: 1 indicates Less influential, 2 indicates Moderately influential, and 3 indicates Influential. So that it can form a table like the following: **Tabel 3. 3 Bobot Awal**

Kriteria	Alternatif		
	P1	P2	P3
C1	3	3	3
C2	2	3	2
C3	3	2	3
C4	1	3	2
C5	3	2	2
C6	3	2	1
C7	3	3	2
C8	3	3	1
C9	3	2	2

C10	2	3	1
C11	3	3	3
C12	1	1	3
C13	3	3	1
C14	2	3	1
C15	2	2	3
Total w$_j$ ◻	105		

3. Improvement or normalization of weights

Perform the calculation of the initial weight normalization (wj) so that the total is ◻ wj=1, using the following

formula: W$_j$ $= \dfrac{cj}{Total\, \Sigma wj}$; j=1,2,3,…   (3.1)

4. Determine the weight of course grades

The weight of the grades for this course is determined based on the grades possessed by each student which will determine the field of specialization. The following is a list of student course grades that will be used as a sample to determine student areas of specialization.

Table 3 Bobot Nilai Mata Kuliah

Kriteria	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15
Nilai	4	3.5	3.5	4	3.5	3.5	3	4	3.5	4	3	4	4	3	4

5. *Determine the value of the vector S*
To find the value of vector S can be done by using the following formula:

$$S_i = \Pi_{j=1}^{n} Xij^{wj} ; i=1,2,3,….\qquad (3.2)$$
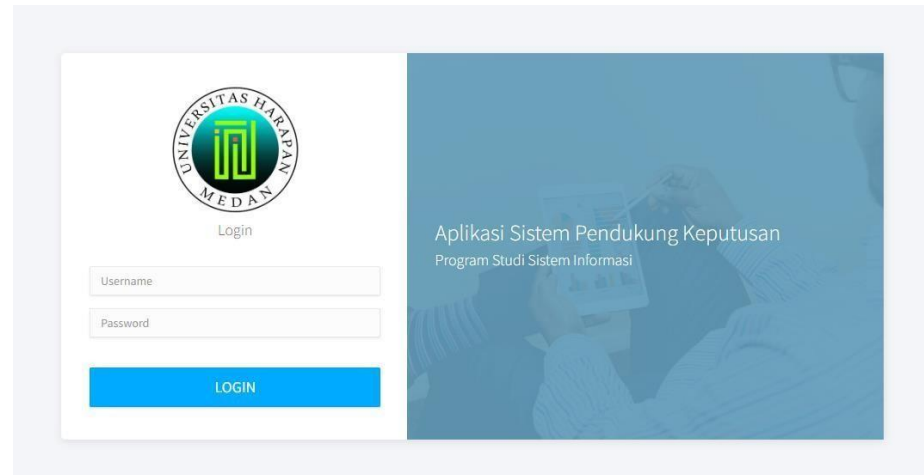
Information:
S: states alternative preferences analogous to a vector S

3. RESULTS AND DISCUSSION (10 PT)

3.1 Tampilan Halaman Login
On the admin login page display this displays a login form, which must be filled in with a *username* and *password* to enter the system. The display of the login page contained in this application can be seen in figure 1

Gambar 1 Halaman Login

3.2 Admin Main Page View

The main admin page is the first view that will appear after logging *in.* This main page serves to display a menu of categories such as: Students, Criteria, and Alternatives that can be selected as needed and can only be managed by the study program admin. The appearance of the admin main page contained in this application can be seen in figure 2.
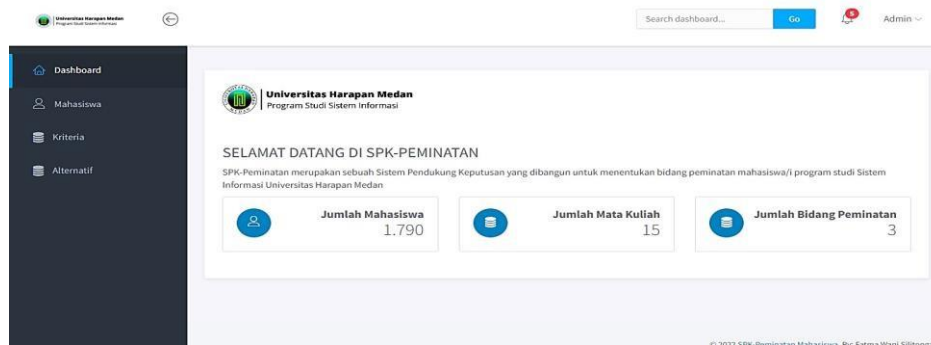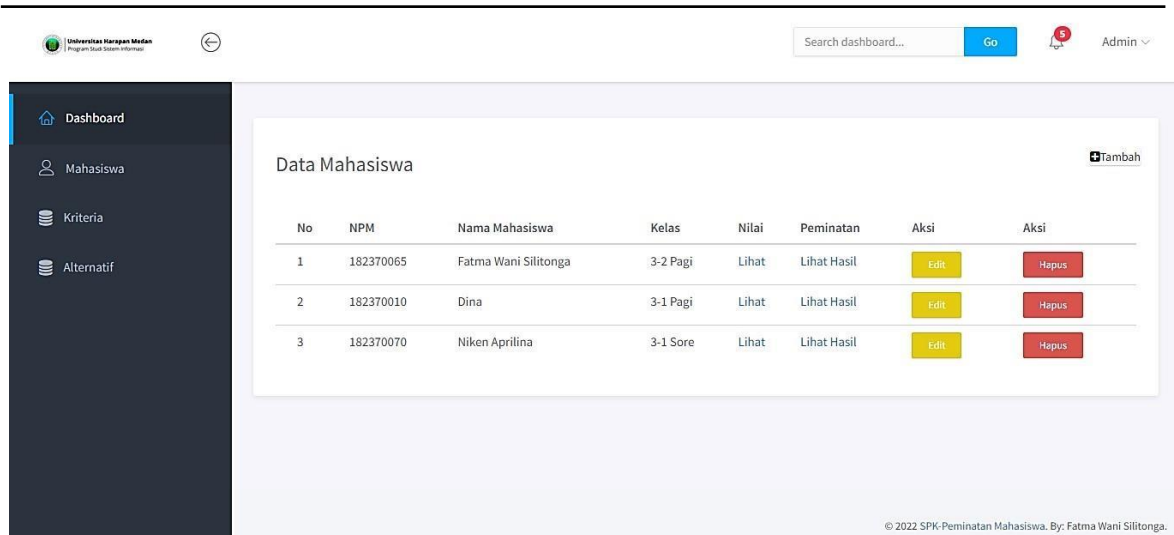

Figure 2 Admin Home Page

3.3 Student Data Page View

This page contains student data that will take specialization courses, on this page the study program admin can add student data, edit student data and delete student data. The display of the student data page contained in this application can be seen in figure 3.
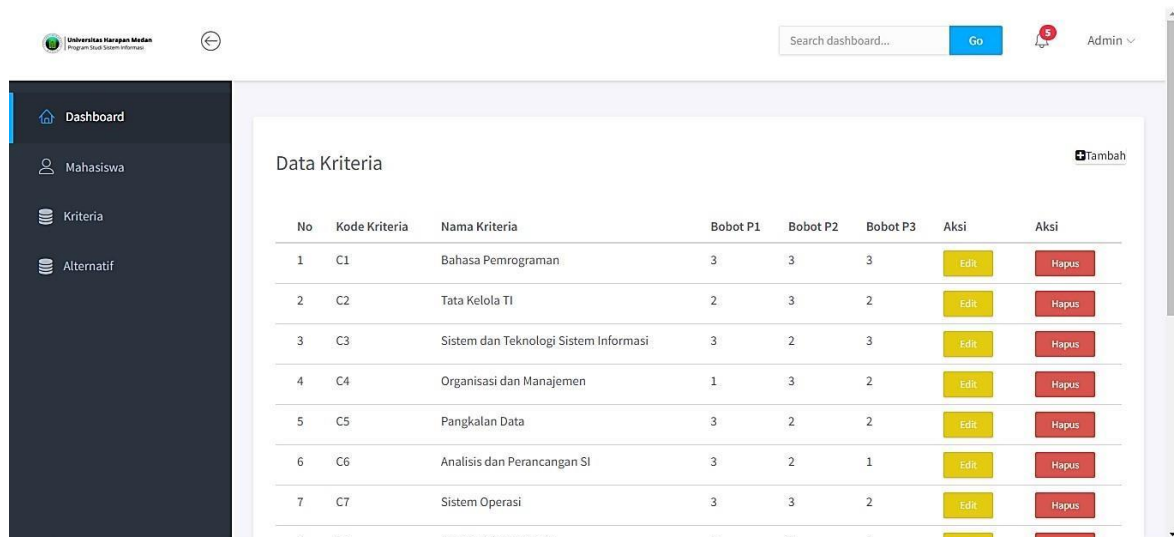
6 ☐

Figure 3 Student Data Page

3.4 Criteria Data Page Display

This page contains criteria data or a list of courses consisting of semester 1 to semester IV, on this page the study program admin can add criteria data, edit criteria data and delete criteria data. The display of the criteria data page contained in this application can be seen in figure 4.

Gambar 4 Halaman Data Kriteria

3.5 Alternate Data Page View

This page contains alternative data or specialization in information systems consisting of Business Analytics, Information Management, and Intelligent Systems. On this page, study program admins can edit alternative data and delete alternative data. The alternative data page display contained in this application can be seen in figure 5.
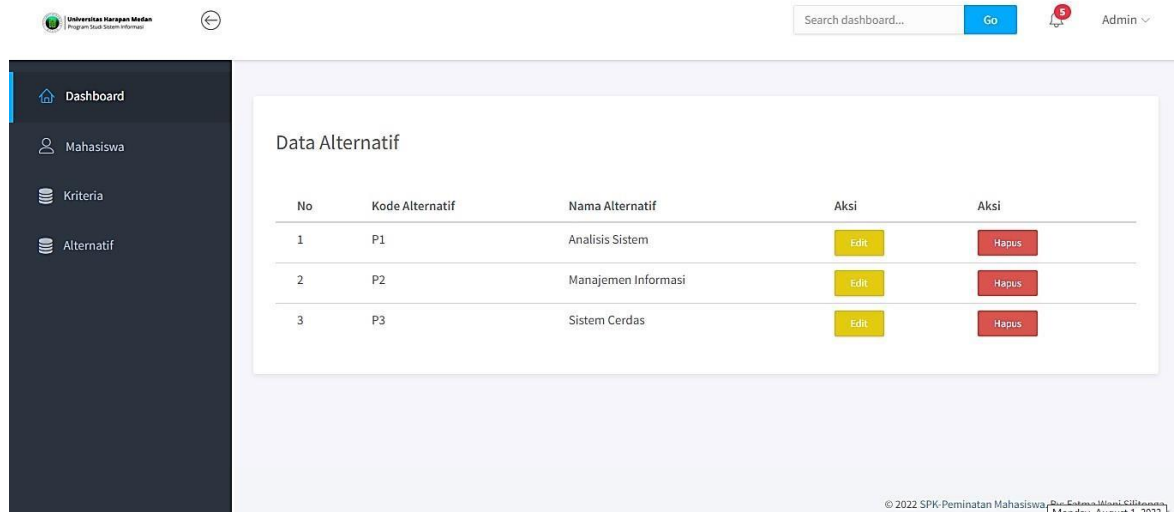
Figure 5 Alternate Data Page

3.6 MK Value List Page Display

This page is located in the 'Student Data' menu and contains the course scores of each student. On this page, the study program admin can edit and edit the course scores owned by each student. The display of the mk value list page contained in this application can be seen in figure 6.
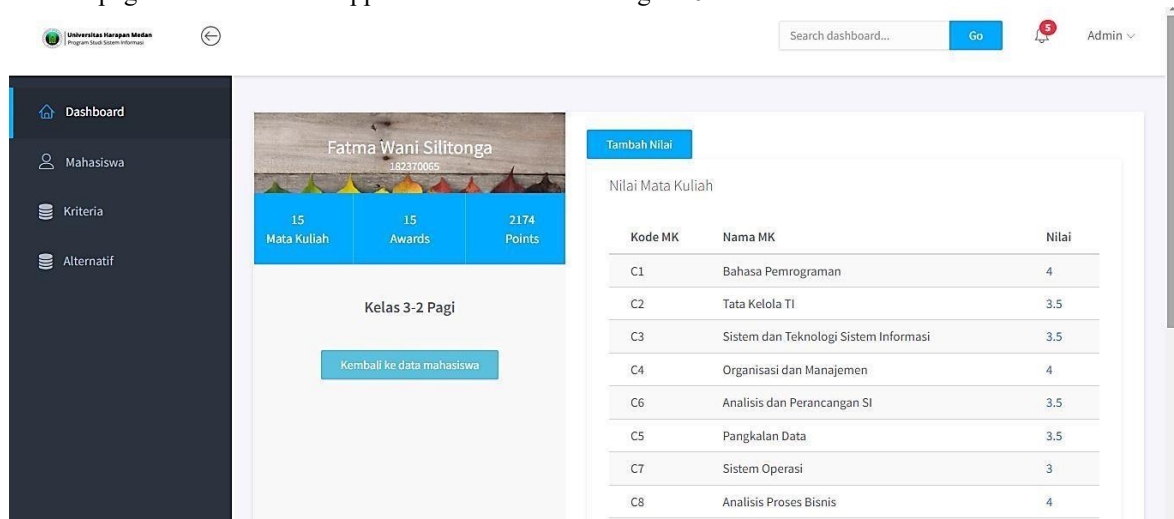

Figure 6 MK Value List Page

3.7 Calculation Results Page View

This page contains the calculation results using the WP method, on this page the study program admin and students can see the calculation results and areas of interest that suit each student. The page view of the calculation results contained in this application can be seen in figure 7.
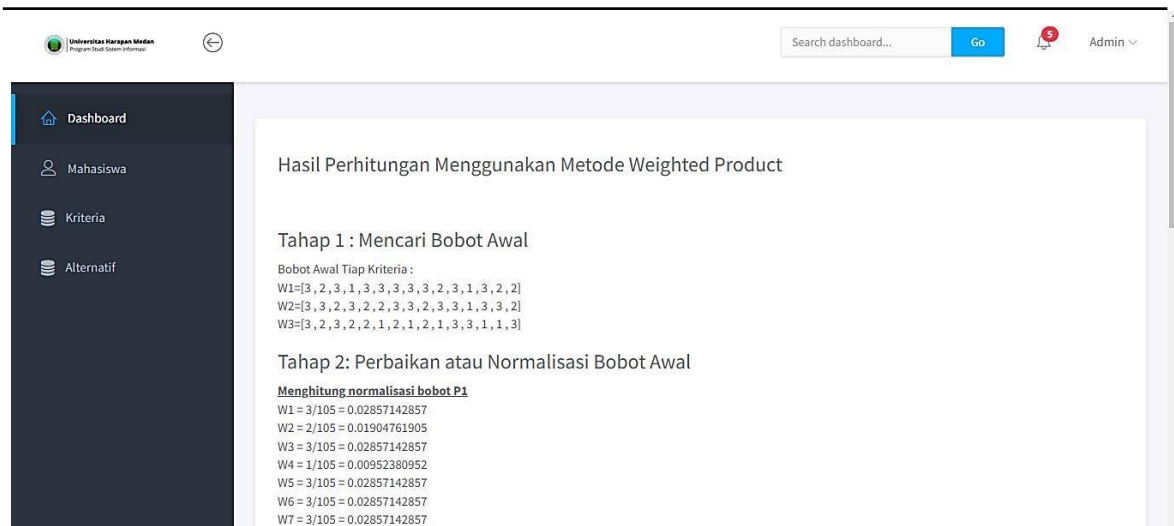
Figure 7 Calculation Results Page

4. CONCLUSION

Based on the results of decision support system research in determining the field of interest of information systems students, the author makes the following decisions:

1. This system can be a solution for the information systems study program in the process of determining student areas of interest to be more accurate and systematic because it uses the SPK calculation method.
2. This system can minimize the process of determining the field of interest of students because it does not go through a long process as before to get the field of interest of each student.
3. This system can minimize the subjective assessment process because it has used calculations through the Weighted Product (WP) method and produces priority alternative ranking reports.

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