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Implementation of Profile Matching Method in Student Major Information System at SMAN 4 Mataram

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Abstract **Education is a crucial component in a country's development, and the quality of education is a key factor in determining national progress. In Indonesia, the Ministry of Education, Culture, Research, and Technology has implemented the Merdeka Curriculum, which provides students with greater flexibility to choose subjects based on their interests and talents. At SMAN 4 Mataram, the subject selection process starting in the second semester of grade 10 still faces challenges, such as students' difficulty in determining suitable majors and the lack of an integrated data management system. This study developed a decision support system based on the Profile Matching method to provide objective major recommendations by aligning students' competencies with the criteria of each major. The system was developed using the Waterfall model to ensure a structured design process. Testing was carried out with White Box Testing to validate algorithm calculations, Black Box Testing to check system functionality, and User Acceptance Testing to assess user satisfaction. The results showed a very positive response from administrators (MOS 4.95 out of 5.00) and a positive response from students (MOS 4.00 out of 5.00). This research contributes a practical and flexible decision support solution specifically adapted to high schools implementing the Merdeka Curriculum. With this system, the major selection process is expected to become more efficient, integrated, and capable of providing recommendations that better align with students' interests, talents, and academic potential.**

***Key words*: Education, Decision Support System (DSS), Majoring, Profile Matching, Waterfall.**

I. Introduction

Education is an important component in the development of a country, with the quality of education being a key factor in determining the progress of a nation [1]. In Indonesia, the education system is managed by the Ministry of Education, Culture, Research, and Technology (Kemendikbud Ristek), which is responsible for the development and implementation of national education policies. One of its flagship programs is the Merdeka Curriculum, which has been implemented since the 2021/2022 academic year in 2,500 schools, including high schools. This curriculum provides flexibility for students to choose subjects according to their interests, talents, and aspirations [2].

At the high school level, specialization plays an important role in guiding students toward fields of study that match their talents, interests, and future goals [3]. SMAN 4 Mataram has implemented the Merdeka Curriculum since 2022, which gives students flexibility in choosing subjects based on their interests. Specialization begins in the second semester of 10th grade with four options: Environmental Health Sciences, Applied Sciences, Social Sciences, and Humanities, based on report card grades, psychological test results, and student interests. However, challenges include mismatches between specializations and students' talents and interests, influence from parents and peers, and difficulties in understanding course material.

Currently, the course selection process is still carried out manually by collecting data through Google Forms, while psychological tests are managed by a third party, resulting in course selection data not being centralized in a single integrated system. This makes it difficult for schools to monitor and manage information comprehensively and hinders guidance for students who need to adjust their course selection. Therefore, an information system is needed that can integrate all data and simplify the management of student career guidance.

Based on the existing problems, a solution is proposed in the form of designing a web-based Student Guidance Information System integrated with a Decision Support System (DSS). This system is designed to take into account students' report card grades, IQ test results, and interests in providing the most suitable major recommendations. The DSS is a component of the information system focused on supporting complex decision-making processes, such as determining students' majors, through accurate and structured data analysis.

In the decision-making process, the Profile Matching method is used, which compares students' competencies with the competencies required by each department to identify gaps as the basis for departmental recommendations [4]. This system was developed using the Waterfall method, which is a structured and sequential system development method with detailed planning without repeated iterations [5]. Testing was conducted using black box testing to evaluate system functionality, white box testing to examine the internal structure of the code, and user acceptance testing (UAT) to ensure the system's alignment with user needs.

With the development of this system, it is expected that the student majoring process will become more objective and efficient, supported by a centralized and integrated data management system that facilitates digital access and information processing. Furthermore, this research aims to provide a practical and flexible decision support solution that can be adapted by various senior high schools implementing the Merdeka Curriculum across Indonesia, thereby addressing the need for a more personalized and scalable majoring process aligned with students' interests and talents.

II. Literature Review and Basic Theory

A. Related Research

In this research, the references used are sourced from various previous studies. This is intended to serve as a basis for comparison and a reference in designing the system to be developed.

The first research discusses the development of a decision support system for major selection at SMPN 210 Jakarta using the profile matching method. This system matches student profiles with majors based on several criteria, such as academic grades, psychological test results, student interests, and input from parents. The results of the system development make it easier for students to choose majors that match their interests, abilities, and goals. In addition, this system also increases the efficiency and effectiveness of the decision-making process for choosing students' majors [6].

The second research discusses the development of a decision support system application for the election of the chairman of the Information Systems Student Association using the PXP method in system development and the Weighted Product method for calculation. The criteria used include candidate ratings, criteria weights, and alternative suitability ratings. The results showed consistency between manual calculations and the developed application [7].

The third study discusses the use of the profile matching method to determine recipients of temporary direct community assistance, based on criteria such as living conditions and economic status. The results indicated that applying this method led to the efficient and targeted selection of beneficiaries. With this system, the government is expected to be more responsive in providing assistance to those in need [8].

In addition to local case studies, a number of international studies have been exploring the application of decision support systems in the broader context of education. One study developed a machine learning-based DSS using logistic regression to predict new student enrollment in higher education, which showed high prediction accuracy but required large datasets and complex modeling [9]. Another study introduced an artificial intelligence (AI)-based DSS innovation to support strategic planning and student enrollment management in higher education institutions, illustrating the global trend in AI-based decision making [10]. Meanwhile, another study applied the Profile Matching method in a decision support system for the selection of outstanding students, and the results showed the effectiveness of this method in structured decision making based on student assessment criteria [11].

However, most of the existing studies remain limited in both scope and applicability. The local studies reviewed generally produce decision support systems designed only for very specific cases, such as major selection in a single school, student organization leader elections, or social assistance recipient selection. As a result, these systems have not been designed to be adapted or implemented in other schools that may have different needs, criteria, and policies. Meanwhile, international research indicates that machine learning and artificial intelligence-based DSS approaches do offer high accuracy and support strategic decision-making at the higher education level; however, these methods require large historical datasets, complex technological infrastructure, and do not consider the practical realities of high school environments in Indonesia.

In addition, although the Profile Matching method has been shown to be effective in supporting structured decision-making, most existing studies have not integrated this method into a system that is modular, flexible, and directly validated by end-users—particularly at the high school level, which has begun implementing the Merdeka Curriculum. In fact, the Merdeka Curriculum emphasizes the importance of a more personalized major selection process, tailored to each student's interests, talents, and unique characteristics. Based on these observations, it is clear that current systems are either limited to narrow use cases or rely on infrastructures unsuitable for widespread adoption in high schools. Therefore, this research provides a significant contribution by developing a decision support system based on the Profile Matching method that is not only simple and user-friendly, but also modularly designed to be adapted to the needs of other schools. The system has been validated directly by users through satisfaction testing to ensure its practicality, and it can be widely implemented across senior high schools in Indonesia adopting the Merdeka Curriculum, with each school able to customize the assessment criteria and weighting according to their respective policies and educational goals.

B. Supporting Theory

The following are general theories that are used as support in this research:

B.1. System Information

An information system is a system consisting of components within an organization that collect, process, store, and disseminate information to support decision-making and coordination within the organization [12].

B.2. Decision Support System

A Decision Support System (DSS) is a knowledge-based system that assists decision makers by providing information, recommendations, and data-driven analysis. Its main purpose is to support rational and accurate decisions based on available facts [11].

B.3. Selection of Majors

The selection of majors is a series of activities aimed at helping prospective students channel their interests and competencies into various school activities in accordance with their talents and abilities [4]. At the high school level, the selection of majors is an important step for students, with the aim of grouping them based on their talents, interests, abilities, and potential. This process is expected to support the suitability and success of students in achieving future achievements [13].

B.4. Profile Mathcing

Profile matching is a decision-making approach where ideal predictor variable levels are assumed to be met by the subject for optimal outcomes [4]. This method suggests individuals should possess ideal variables, not just meet minimum requirements. It classifies individuals as good or poor and evaluates them based on several criteria [14]. Profile matching is widely used in major selection in education, employee recruitment, and performance assessment to measure alignment between individual profiles and ideal profiles [13]. One advantage is its ability to speed up the analysis of students' values and interests, aligned with school standards, facilitating more efficient decision-making [15].

B.5. Waterfall

The Waterfall model is a commonly used Software Development Life Cycle (SDLC) model in information system or software development. The process is carried out in stages, requiring developers to understand the workflow and characteristics of the model [5]. The stages in the Waterfall development model consist of Requirements, Analysis, Design, Implementation, Testing, and Maintenance.

B.6. White Box Testing

White box testing tests program code in detail to detect errors. The basis path testing technique in this method produces more comprehensive test cases, thereby increasing testing coverage and optimally detecting bugs [16].

B.7. Black Box Testing

Black box testing tests the functionality of a system without regard to its internal processes. This testing focuses on verifying inputs and outputs, as well as detecting errors in the interface, data structure, database access, performance, and system initialization [17].

B.8. User Acceptance Testing (UAT)

User Acceptance Testing (UAT) is the final stage of system testing by users to ensure that the application meets their needs. This testing assesses functionality, reliability, usability, and efficiency through questionnaires with specific rating scales [8].

III. Research Methodology

A. Research Flow

The research flow is carried out based on the method used, namely the waterfall method. The flowchart starts from literature review, requirements, analysis, design, implementation, testing, and maintenance. The following is the flow of research conducted by the author as in Fig. 1.

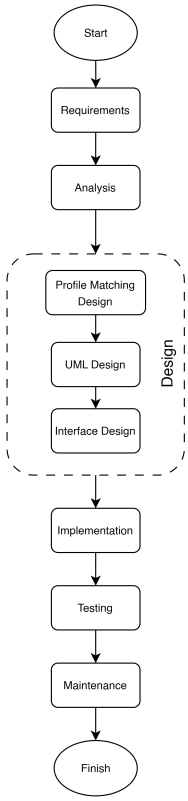


Fig. 1. Research Flow

A.1. Requirements

At the requirements phase, the researchers conducted a literature study to understand the concepts of Profile Matching, decision support systems, and the appropriate system development method, namely the Waterfall model. This literature review included journals, books, and previous studies relevant to the implementation of the Profile Matching method in student major selection systems. Additionally, the researcher conducted interviews with the Vice Principal for Curriculum were carried out to gather information on the student majoring process and the required data for Profile Matching calculations to be integrated into the decision support system.

A.2. Analysis

At the analysis phase, the researchers analyze system requirements in detail, covering both functional and non-functional aspects. During this phase, the features to be implemented in the system are also specified. These system features are designed based on the analysis results to ensure that all requirements are effectively met and to support a structured development process.

A.3. Design

A.3.1. Profile Matching Design

In this phase, the Profile Matching system design is carried out as a method in the decision support system for selecting student majors. This design aims to ensure that the major selection process is carried out systematically, objectively, and in accordance with predetermined criteria. The system will assess students based on academic and non-academic criteria to determine the major that best suits their abilities and potential.

Before proceeding to the calculation and recommendation stages, the first step is to provide a Table of Alternatives Against Criteria as in Table I. This table lists the students' pure scores on various predetermined criteria. This data is used to process the comparison between the student's score and the target score or ideal profile for each major.

TABLE I. CONTENT OF ALTERNATIVES ON CRITERIA

Student Name	*Math C1*	*Science C2*	*Social C3*	*Indonesian C4*	*English C5*	*IQ C6*
Student 1	88	89	90	87	95	131
Student 2	75	79	88	85	78	99
Student 3	75	73	76	78	72	96

The process of applying the Profile Matching method includes several main phases, which are:

1. Determining the criteria and weighting for each major.

The first step is to determine the criteria for each major and assign appropriate weights. These criteria include both academic and non-academic factors.

TABLE II. CRITERIA AND SUB CRITERIA

Criteria	*Sub Criteria*	*Value Range*	*Weight*
Academic	Math. Science, Social, Indonesian, English	0 - 75	1
		76 - 80	2
		81 - 85	3
		86 - 89	4
		90 - 100	5
Non-Academic	IQ	75 - 79	1
		80 - 89	2
		90 - 109	3
		110 - 119	4
		⩾ 120	5

2. Assigning target score/ideal profiles.

The next step is to assign target scores or ideal profiles for each major, which will be used as a reference during the profile matching process.

TABLE III. IDEAL PROFILE VALUE FOR EACH MAJOR

Ideal Profile Value	*Math C1*	*Science C2*	*Social C3*	*Indonesian C4*	*English C5*	*IQ C6*
Environmental Health	4	4	3	3	3	3
Applied Science	4	4	3	3	3	3
Social Sciences	3	3	4	3	3	3
Humanities	3	3	3	4	4	3

3. Grouping primary and secondary factors.

The criteria are then classified into primary and secondary factors. Primary factors (CF) are the most important criteria for a given major, while secondary factors (SF) are less important.

TABLE IV. GROUPING OF PRIMARY AND SECONDARY FACTORS

Ideal Profile Value	*Math C1*	*Science C2*	*Social C3*	*Indonesian C4*	*English C5*	*IQ C6*
Environmental Health	CF	CF	SF	SF	SF	CF
Applied Science	CF	CF	SF	SF	SF	CF
Social Sciences	SF	SF	CF	SF	SF	CF
Humanities	SF	SF	SF	CF	CF	CF

4. Determining GAP score weights.

The next phase is to determine the GAP score weights, which indicate the level of qualification difference between the student's normalized score and the ideal profile.

TABLE V. GAP VALUE WEIGHT

GAP	*Weight Value*	*Description*
0	5	Qualification as required
1	4.5	1 level excess qualification
-1	4	Qualification lacking 1 level
2	3.5	2-level excess qualification
-2	3	Qualification lacking 2 levels
3	2.5	3-level excess qualification
-3	2	Qualification lacking 3 levels
4	1.5	Overqualification 4 levels
-4	1	Qualification lacking 4 levels
5	0.5	Overqualification 5 levels

5. Nomalizing student data.

Normalization is the process of converting raw data (student scores) into standardized values according to the predefined criteria.

TABLE VI. STUDENT SCORE NORMALIZATION RESULTS

Student Name	*C1*	*C2*	*C3*	*C4*	*C5*	*C6*
Student 1	4	4	5	4	5	5
Student 2	1	2	4	3	2	3
Student 3	1	1	2	2	1	3

6. Calculating GAP scores.

Once the student data is normalized, the next step is to calculate the GAP scores by subtracting the normalized values from the ideal profile values.

The following is an example of how to calculate the C1 criteria for Environmental Health Science majors to determine the GAP value with the formula:

$$GAP = Normalized\ Value - Ideal\ Profile$$

For example, for student 1:
- Student normalization score (C1): 4
- Ideal profile (C1) for Environmental Health Science: 4

Then the calculation of the GAP value is:

$$GAP = 4 - 4 = 0$$

The calculation results show that Student 1 gets a value of 0, which means that there is no difference between the normalized value and the ideal profile set for the Environmental Health department on the C1 criteria. This indicates that a GAP value of 0 indicates qualifications that are fully in accordance with the requirements needed. The results of the GAP value calculation can be seen in Table VII, Table VIII, Table IX, and Table X below.

TABLE VII. GAP SCORE OF ENVIRONMENTAL HEALTH SCIENCE MAJOR

Student Name	*C1*	*C2*	*C3*	*C4*	*C5*	*C6*
Student 1	0	0	2	1	2	2
Student 2	-3	-2	1	0	-1	0
Student 3	-3	-3	-1	-1	-2	0

TABLE VIII. GAP SCORE OF APPLIED SCIENCE MAJOR

Student Name	*C1*	*C2*	*C3*	*C4*	*C5*	*C6*
Student 1	0	0	2	1	2	2
Student 2	-3	-2	1	0	-1	0
Student 3	-3	-3	-1	-1	-2	0

TABLE IX. GAP SCORE OF SOCIAL MAJOR

Student Name	*C1*	*C2*	*C3*	*C4*	*C5*	*C6*
Student 1	1	1	1	1	2	2
Student 2	-2	-1	0	0	-1	0
Student 3	-2	-2	-2	-1	-2	0

TABLE X. GAP SCORE OF HUMANITIES MAJOR

Student Name	*C1*	*C2*	*C3*	*C4*	*C5*	*C6*
Student 1	1	1	2	0	1	2
Student 2	-2	-1	1	-1	-2	0
Student 3	-2	-2	-1	-2	-3	0

7. Converting GAP scores.

After calculating the GAP value, the next step is to convert it to find out the value of the student's GAP weight in each department. This conversion process is adjusted to the GAP value and weights that have been determined in Table V above. For example, a GAP value of 0 will be converted to 5 in accordance with the applicable provisions. The conversion results can be seen in Table XI, Table XII, Table XIII, and Table XIV below.

TABLE XI. GAP WEIGHT VALUE ENVIRONMENTAL HEALTH SCIENCE MAJOR

Student Name	*C1*	*C2*	*C3*	*C4*	*C5*	*C6*
Student 1	5	5	3.5	4.5	3.5	3.5
Student 2	2	3	4.5	5	4	5
Student 3	2	2	4	4	3	5

TABLE XII. GAP WEIGHT VALUE APPLIED SCIENCE MAJOR

Student Name	*C1*	*C2*	*C3*	*C4*	*C5*	*C6*
Student 1	5	5	3.5	4.5	3.5	3.5
Student 2	2	3	4.5	5	4	5
Student 3	2	2	4	4	3	5

TABLE XIII. GAP WEIGHT VALUE SOCIAL MAJOR

Student Name	*C1*	*C2*	*C3*	*C4*	*C5*	*C6*
Student 1	4.5	4.5	4.5	4.5	3.5	3.5
Student 2	3	4	5	5	4	5
Student 3	3	3	3	4	3	5

TABLE XIV. GAP WEIGHT VALUE HUMANITIES MAJOR

Student Name	*C1*	*C2*	*C3*	*C4*	*C5*	*C6*
Student 1	4.5	4.5	3.5	5	4.5	3.5
Student 2	3	4	4.5	4	3	5
Student 3	3	3	4	3	2	5

8. Calculating total scores.

The total score is calculated by considering the weight of the primary and secondary factors, with 60% given to primary factors (CF) and 40% to secondary factors (SF).

The formula used to calculate NCF, NSF and total score. For example student 1 for the Environmental Health Science Major.

Academic
- $NCF = \frac{5+5}{2} = 5$
- $NSF = \frac{3.5+4.5+3.5}{3} = 3.83$
- $N1 = 60\% \, x \, 5 + 40\% \, x \, 3.83 = 4.53$

Non-Academic
- $NCF = 3.5$
- $NSF = 0$
- $N2 = 60\% \, x \, 3.5 + 40\% \, x \, 0 = 2.1$

The following are the results of the calculation of NCF and NSF from each major

TABLE XV. CALCULATION OF NCF, NSF, AND TOTAL VALUE OF ENVIRONMENTAL HEALTH SCIENCE MAJOR

Student Name	*Academic*		*N1*	*Non-Academic*		*N2*	*Total Value*
	NCF	NSF		NCF	NSF		
Student 1	5.00	3.83	4.53	3.5	0	2.1	6.63
Student 2	2.50	4.50	3.30	5	0	3	6.30
Student 3	2.00	3.67	2.67	5	0	3	5.67

TABLE XVI. CALCULATION OF NCF, NSF, AND TOTAL VALUE OF APPLIED SCIENCE MAJOR

Student Name	*Academic*		*N1*	*Non-Academic*		*N2*	*Total Value*
	NCF	NSF		NCF	NSF		
Student 1	5.00	3.83	4.53	3.5	0	2.1	6.63
Student 2	2.50	4.50	3.30	5	0	3	6.30
Student 3	2.00	3.67	2.67	5	0	3	5.67

TABLE XVII. CALCULATION OF NCF, NSF, AND TOTAL VALUE OF SOCIAL MAJOR

Student Name	*Academic*		*N1*	*Non-Academic*		*N2*	*Total Value*
	NCF	NSF		NCF	NSF		
Student 1	4.50	4.25	4.40	3.5	0	2.1	6.50
Student 2	5.00	4.00	4.60	5	0	3	7.60
Student 3	3.00	3.25	3.10	5	0	3	6.10

TABLE XVIII. CALCULATION OF NCF, NSF, AND TOTAL VALUE OF HUMANITIES MAJOR

Student Name	*Academic*		*N1*	*Non-Academic*		*N2*	*Total Value*
	NCF	NSF		NCF	NSF		
Student 1	4.75	4.17	4.52	3.5	0	2.1	6.62
Student 2	3.50	3.83	3.63	5	0	3	6.63
Student 3	2.50	3.33	2.83	5	0	3	5.83

9. Calculating rankings/major recommendations.

The final step is to calculate the rankings based on the total scores. The student with the highest total score is recommended for the major that best suits their profile.

$$Rangking\ Major\ X = (N1\ Academic\ X) + (N2\ Non\ Academic\ X)$$

TABLE XIX. RESULT OF MAJOR RECOMMENDATION

Student Name	*Environmental Health*	*Applied Science*	*Social*	*Humanities*	*Result*
Student 1	6.63	6.63	6.50	6.62	Environmental Health
Student 2	6.30	6.30	7.60	6.63	Social
Student 2	5.67	5.67	6.10	5.83	Social

Based on Table XIX, the students recommended to majors are those with the highest scores in the ranking calculation, which combines academic and non-academic scores. This major recommendation reflects the results of an evaluation that considers the student's overall performance, with the aim of placing them in the major that best suits their abilities and interests.

A.3.2. UML Design

1. Use Case Diagram

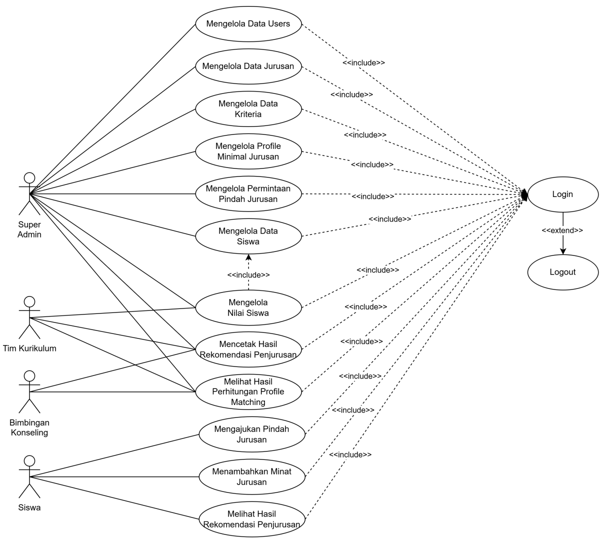


Fig. 2. Use Case Diagram

The Use Case Diagram illustrates the interactions between actors and the system, as well as the main functions that can be implemented. The actors involved in this system include the Super Admin, Students, Curriculum Team, and Counseling Guidance, each with distinct roles and access levels according to their responsibilities. The Use Case for the student majoring information system is shown in Fig. 2.

2. Entity Relationship Diagram

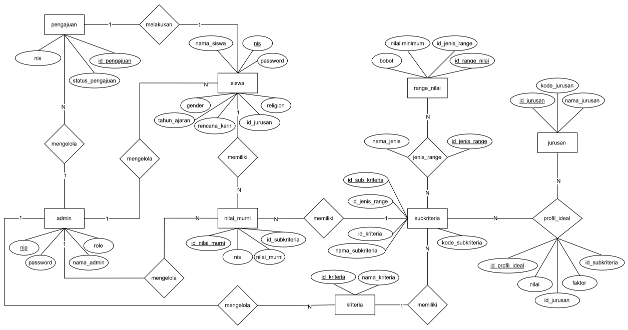


Fig. 3. Entity Relationship Diagram

Based on the use case diagram that has been designed, a database structure can be developed to store and manage the data needed in the system. The system consists of 10 tables with appropriate attributes and data types. Relationships between tables describe the relationship of data in the system to support the functionality that has been identified. The ERD of the student majoring information system can be seen in Fig. 3.

3. Class Diagram

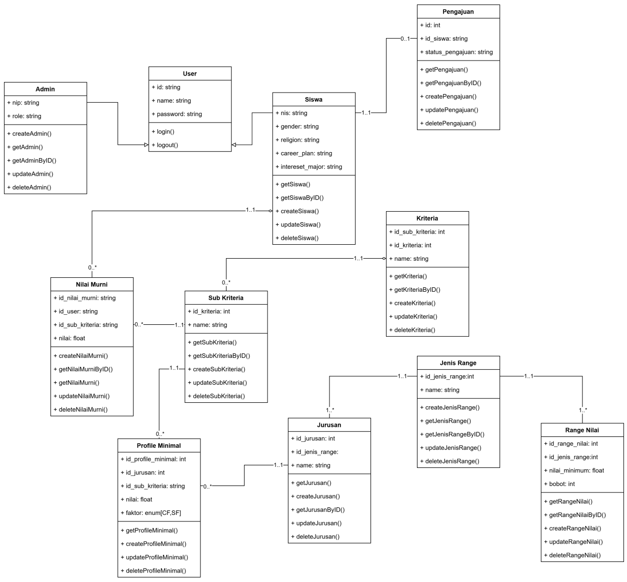


Fig. 4. Class Diagram

At the system development phase, class diagrams have an important role in representing the relationships between objects in the system, including their relationships with databases and applications. This diagram represents entities in the form of classes with appropriate attributes and methods, facilitating the development of Object-Oriented Programming-based systems. The design of the class diagram of the student management information system can be seen in Fig. 4.

4. Activity Diagram

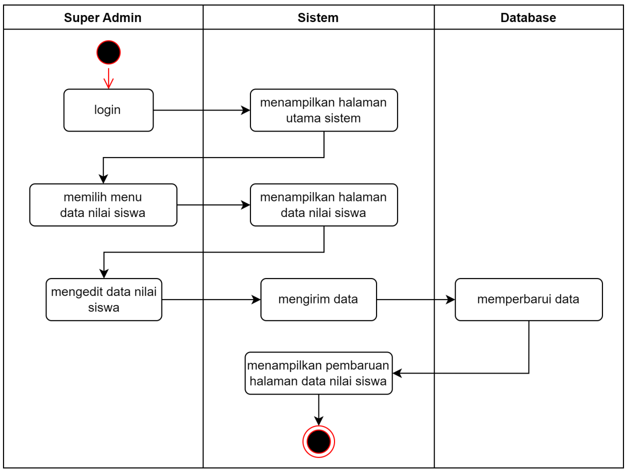


Fig. 5. Activity Diagram

Activity diagram in Fig. 5. is one of the system designs that represents the workflow of the system in the form of depicting the activities that occur in the system when filling in the student grades by the super admin.

5. Sequence Diagram

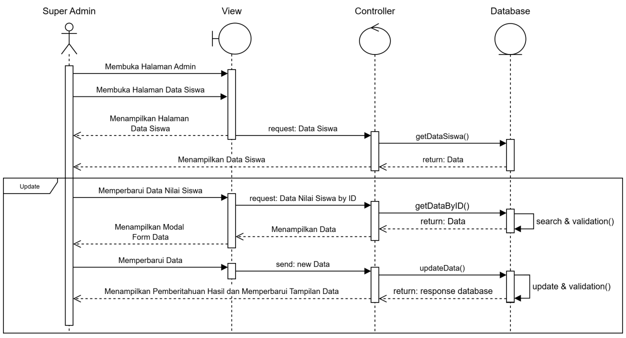


Fig. 6. Sequence Diagram

Sequence diagram is a system design that represents interactions between objects in the system in detail. The design of the sequence diagram of the student management information system can be seen in Fig. 6.

A.4. Implementation

In the implementation phase, the main focus is the application of the Profile Matching method as a decision support system in the selection of majors. After the method is applied, system development is carried out by translating the design into programming code through the stages of code generation, unit testing, and code refactoring to ensure the functionality and integration of the system runs optimally.

A.5. Testing

After the implementation process is complete, the next stage is to test the system that has been built. System testing is carried out to ensure all features function according to user needs. Testing includes three main methods: White Box Testing to validate program logic, Black Box Testing to test system functionality, and User Acceptance Testing (UAT) to evaluate the level of user satisfaction with the developed system.

B. Potential Replication in Other Schools

The methods and systems designed in this research are flexible and can be adapted by other schools that have similar needs in the student's majoring process. This is possible because the basic principle of the Profile Matching method only compares students' actual scores with the target scores or ideal profiles that have been determined. Therefore, as long as schools have clear assessment criteria and can set ideal profiles for each major, then this system can be implemented easily without the need to make significant changes to the structure or logic of the calculation. In addition, the criteria and weights in this method can be adjusted to the policies of each school, resulting in a relevant recommendation system.

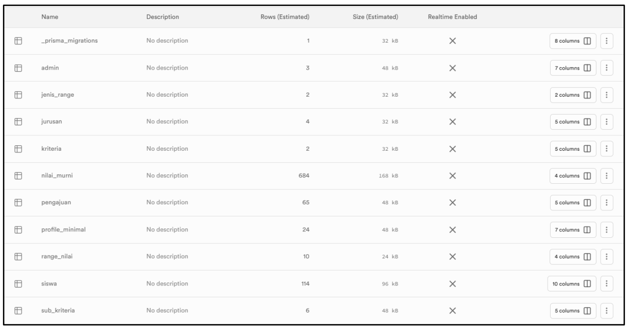
IV. Results and Discussion

A. Implementation

In this chapter, we will describe the implementation of the system design described in the previous chapter, which consists of the implementation of system design, database implementation, system interface and system testing.

A.1. Implementation Database

The database used has been created based on the design in the previous chapter. The database built is named spk which consists of 10 tables, can be seen in Fig. 7.



Name	Description	Rows (Estimated)	Size (Estimated)	Realtime Enabled	
_prisma_migrations	No description	1	32 kB	×	8 columns
admin	No description	3	48 kB	×	7 columns
jenis_range	No description	2	32 kB	×	2 columns
jurusan	No description	4	32 kB	×	5 columns
kriteria	No description	2	32 kB	×	5 columns
nilai_murni	No description	684	168 kB	×	4 columns
pengajuan	No description	65	48 kB	×	5 columns
profile_minimal	No description	24	48 kB	×	7 columns
range_nilai	No description	10	24 kB	×	4 columns
siswa	No description	114	96 kB	×	10 columns
sub_kriteria	No description	6	48 kB	×	5 columns

Fig. 7. Information System Database

A.2. Implementation Interface

At this stage, the system interface development is carried out based on the design that has been made previously. Interface implementation aims to ensure that the appearance and interaction of the system is in accordance with user needs, both in terms of ease of navigation and optimal user experience.

A.2.1. System Implementation from the Admin Side

In the information system for student majors at SMAN 4 Mataram, there are 11 features that will be managed by the super admin. First, the super admin will login first, after the super admin has successfully logged in, the super admin can manage student data, manage criteria, manage sub criteria, manage majors, and others. Some of the main features that can be managed by the super admin include:

1. Login

The login feature in Fig. 8, displays a form that allows users to access the system according to their roles and access permissions. On this page, users must enter a valid username and password to access the system. This login process aims to ensure data security and limit access only to authorized users.

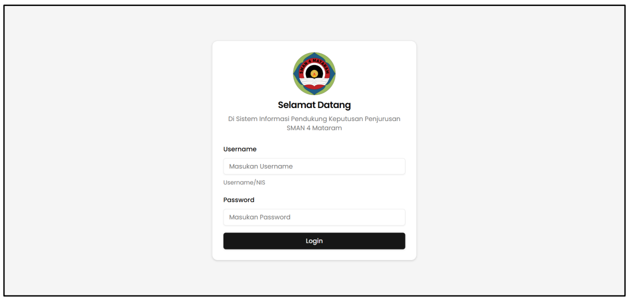


Fig. 8. Login Page

2. Dashboard

The dashboard feature in Fig. 9, presents a summary of student data, majors statistics, and guidance applications in graphical form. The dashboard is designed to provide a quick and informative overview of the system.

Fig. 9. Dashboard Page

3. Students Data Management Page

The student data management feature in Fig. 10, allows the Super Admin to manage student data, including adding, editing, and deleting student information. This page displays a list of students along with important data such as NIS, name, gender, and school year.

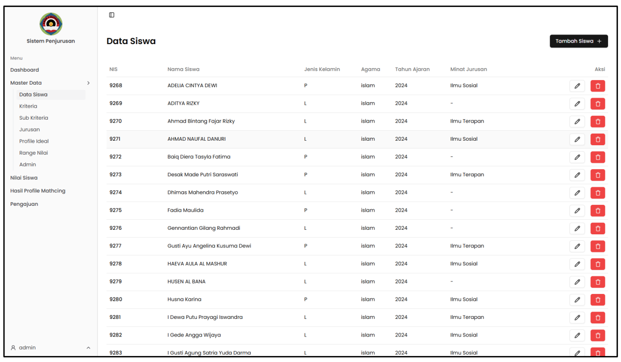


Fig. 10. Students Data Management Page

4. Criteria Management Page

The criteria management feature in Fig. 11, is used to manage the criteria that form the basis of the Profile Matching calculation. Super Admin can add, edit, or delete criteria used in the system.

Fig. 11. Criteria Management Page

5. Sub Criteria Management Page

The sub-criteria management feature in Fig. 12, allows the Super Admin to manage sub-criteria, such as subjects and IQ, which play a role in student's majoring. These sub-criteria are directly related to the predefined main criteria.

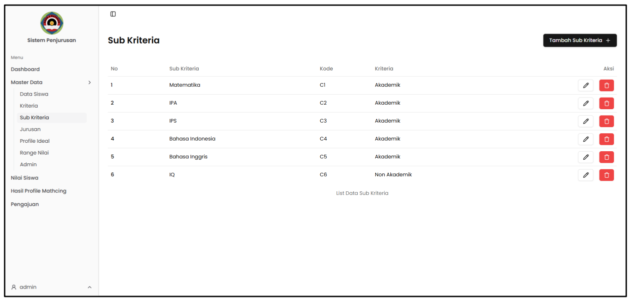


Fig. 12. Sub Criteria Management Page

6. Major Management Page

The major management feature in Fig. 13, is used to manage the list of majors in the system. Super Admin can add, edit, or delete majors and view detailed information related to each major.

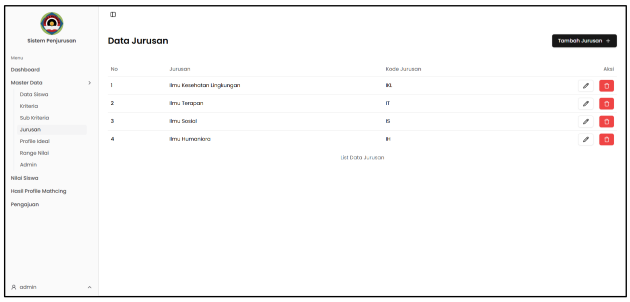


Fig. 13. Major Management Page

7. Ideal Profile Management Page

The ideal profile management feature in Fig. 14, is used to set competency standards for each major based on the Profile Matching method. This ideal profile becomes a reference in calculating the suitability of students with certain majors.

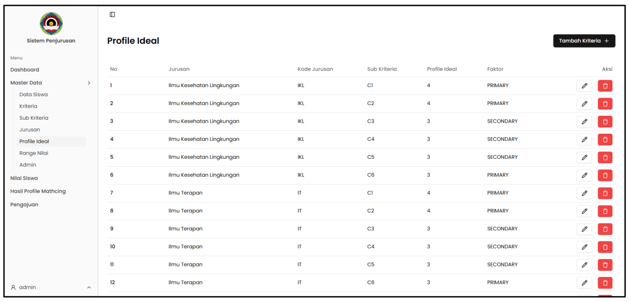


Fig. 14. Ideal Profile Management Page

8. *Student Grade Management Page*

The student grade management feature in Fig. 15, displays student grades used in the calculation of majors. Super Admin can update student grades to ensure the data used in the system remains accurate.

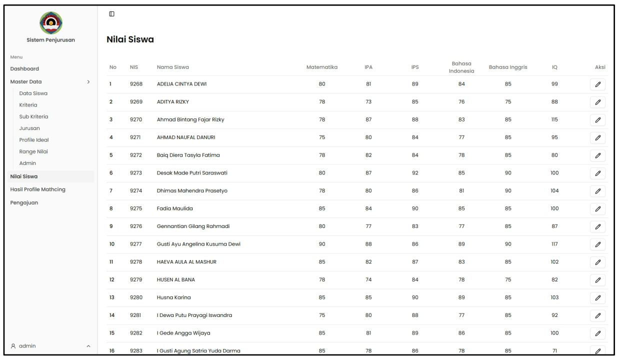


Fig. 15. Student Grade Management Page

9. *Profile Matching Result Page*

The profile matching results feature in Fig. 16, displays the results of major recommendations based on Profile Matching analysis. This page presents details of the calculation results, including the GAP value, GAP weight, and the best major recommendation for students.

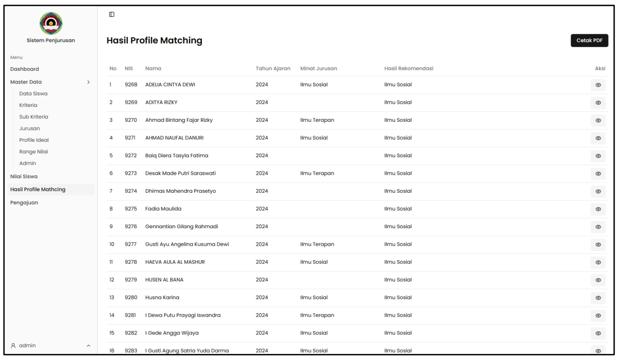


Fig. 16. Profile Matching Result Page

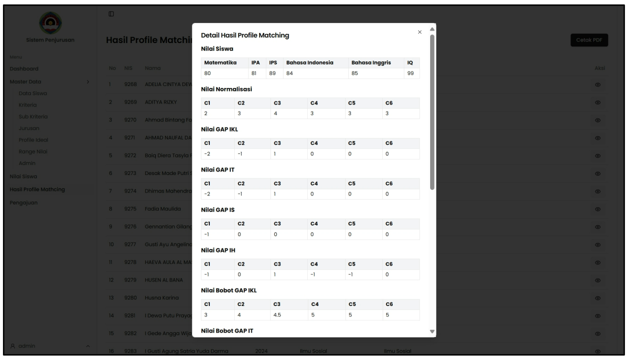


Fig. 17. Profile Matching Result Detail Page

10. *Admin Manajemen Page*

The admin management feature in Fig. 18, is used to manage admin accounts in the system. The super admin can add, edit, or delete admins and set access rights as needed.

Fig. 18. Admin Management Page

11. *Guidance Request Management Page*

The guidance request management feature in Fig. 19, allows students who feel that they do not fit the major recommendation to apply for guidance. The Super Admin or counseling teacher can review the submission, conduct consultation, and adjust the major recommendation if necessary.

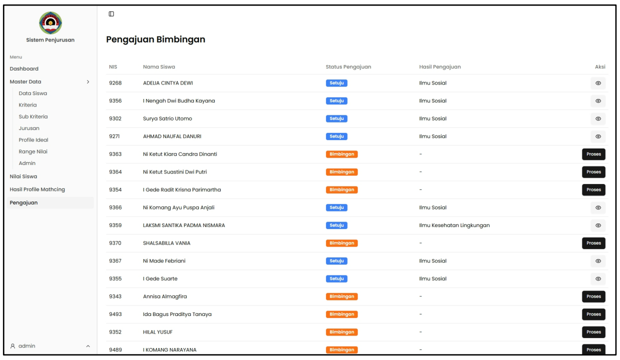


Fig. 19. Guidance Request Management Page

A.2.2. System Implementation from the Student Side

1. Student Major Interests Page

The major interest feature in Figure 20 displays a form that allows students to view academic data that has been inputted by the Super Admin and can choose majors according to their interests and future career plans. If they feel that the recommendation results are not suitable, students can apply for guidance for further discussion.

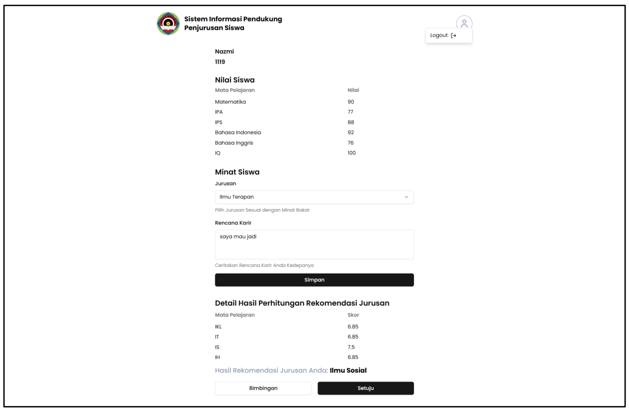


Fig. 20. Student Major Interests Page

A.3. Testing Results

After implementation, the system was tested using white box testing, black box testing, and user acceptance testing (UAT). White box testing ensures the code logic runs correctly through analyzing the execution path. Black box testing tests the functionality of the system without looking at its internal structure, ensuring features work according to specifications. UAT assesses user acceptance of the system through questionnaires, measuring aspects of functionality, usability, and reliability. This test ensures the system functions optimally and according to user needs.

A.3.3. White Box Testing

Test results using White Box Testing show that the Profile Matching calculation system has run according to specifications. Each execution path produces the appropriate output, including in special scenarios such as student data is not available or there is more than one major with the highest score. Calculations from grade normalization to major recommendations have been verified without logical errors. Cyclomatic Complexity value (V(G)) = 4 indicates well-managed complexity, and the base path test covers all major executions. Thus, the system has been proven accurate and ready to be used in student majoring decisions.

A.3.4. Black Box Testing

Black Box Testing shows that all system features run as expected without any functional errors. Login is successful for all actors with the appropriate main page display, and the dashboard displays an overview of system data based on user access rights. Super Admin can manage student data, criteria, sub-criteria, majors, ideal profiles, and user accounts correctly. Management of student grades by the Super Admin or Curriculum Team works without problems, while the Guidance Counseling Teacher can manage guidance applications. Profile Matching calculation results are displayed accurately, according to the expected specifications. In addition, students can fill in major interests and career plans with well-stored data. Each feature is tested with various input scenarios, and the results show that the system has functioned well according to user needs. All tests were declared successful.

A.3.5. User Acceptance Testing (UAT)

User Acceptance Testing was conducted to ensure that the information system for student majors at SMAN 4 Mataram has met the needs of users in accordance with the requirements that have been set. This test was conducted by distributing questionnaires to two main user groups, namely Admin (Super Admin, Curriculum Team, and Counseling Guidance Teacher) and Students.

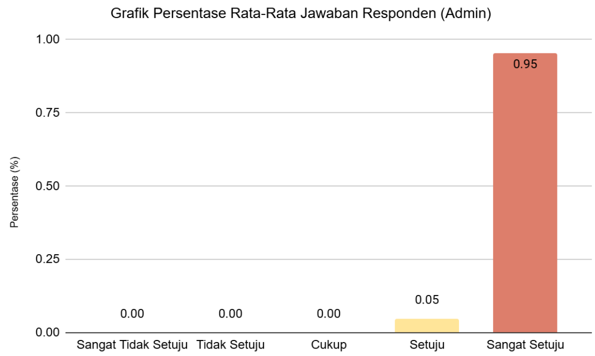


Fig. 21. Percentage Chart of Respondents' Answers to Admin Testing

In testing for Admin actors, a questionnaire was given to 5 respondents with a total of 17 questions covering aspects of system functionality, ease of data management, and clarity of interface display. Based on the results of calculations using the Mean Opinion Score (MOS) scale, an average value of 4.95 was obtained, which indicates that the system received a very good assessment from the Admin. The majority of respondents gave very agreeing answers and no bugs or technical problems were found in the use of the system by the Admin.

Meanwhile, testing on Student actors was carried out by distributing questionnaires to 72 respondents with a total of 10 questions that assessed the ease of use of features, selection of majors, data storage, and clarity of information displayed. Based on the results of the MOS calculation, an average value of 4.00 was obtained, which indicates that the system has a fairly good quality. From the percentage of respondents' answers, 49% chose “Agree”, 27% “Totally Agree”, 22% ‘Fair’, 2% disagreed and 1% chose “Totally Disagree”.

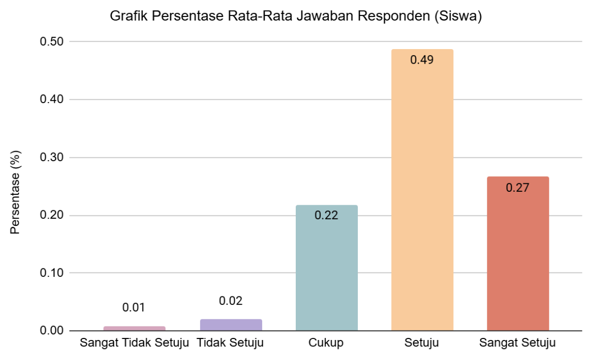


Fig. 22. Percentage Chart of Respondents' Answers to Student Testing

Overall, the results of testing with the User Acceptance Testing method show that the system has successfully met the needs of users with a good level of satisfaction. The high acceptance scores, namely 4.95 from admins and 4.00 from students, indicate that the system is not only technically functional but also in accordance with end-user expectations. This finding is consistent with previous research by [6] [13], which showed that the Profile Matching method is effective in supporting the decision-making process in education, especially in student majors.

The successful implementation of this system is influenced by several factors, including the suitability between student competencies and the ideal profile of the systematically designed majors, as well as the easy-to-use system interface. From a theoretical point of view, these results support the view that a Decision Support System customized to local needs can increase objectivity and efficiency in educational decision-making. The Profile Matching method proved to be suitable for use in environments with clearly defined assessment criteria, as it allows flexible weighting and comparison without requiring the complexity of machine learning algorithms. However, the effectiveness of the system remains highly dependent on the completeness and accuracy of input data, such as academic scores and psychological test results.

V. Conclusions and Suggestions

A.1. Conclusion

Based on the research and system development that has been carried out, the following conclusions can be drawn:

1. The Student Majoring Decision Support System developed using the Profile Matching method in this study is capable of providing objective major recommendations by comparing students' competencies with the ideal profile criteria of each major.
2. The system's data management is integrated, allowing for easier access, more efficient data management by the school, and accelerating the decision-making process in student majoring.
3. The test results indicate that the system has an intuitive and user-friendly interface, with excellent ratings from the admin (Mean Opinion Score of 4.95) and good ratings from students (MOS of 4.00), which demonstrates that the system has successfully met user needs.
4. The method and system developed are flexible and can be adapted by other schools implementing the Merdeka Curriculum by adjusting assessment criteria and weightings according to their respective policies. This potential for replication broadens the contribution of this system in supporting decision-making processes in secondary education across various schools in Indonesia.
5. Nevertheless, the effectiveness of the system remains dependent on the completeness and accuracy of input data, such as academic grades and psychological test results. Other important aspects to consider include the need for periodic data updates and training for users to ensure optimal and sustainable use of the system in different educational environments.

A.2. Suggestions

The following suggestions are proposed to improve the quality and effectiveness of the decision support system for student majoring in the future, both at SMAN 4 Mataram and other schools:

1. Add a report filtering feature based on academic years to facilitate the archiving and evaluation of student data over time.
2. Include a feature for importing student data from external files to accelerate the data input process and reduce manual errors.
3. Refine the print format of the major recommendation results so that it appears more systematic, clear, and easy to interpret by teachers and students.
4. Develop features for regular data updates and integrate non-academic assessment indicators, such as students' interests and talents, so the system can capture student potential more comprehensively.
5. Provide systematic training and assistance for teachers, counselors, and curriculum teams on how to operate and optimize the system, ensuring effective and sustainable use across various schools implementing the Merdeka Curriculum.

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