International Journal Software Engineering and Computer Science (IJSECS) 3 (3), **2023, 397-403**
Published Online December 2023 in IJSECS (http://www.journal.lembagakita.org/index.php/ijsecs)
P-ISSN : 2776-4869, E-ISSN : 2776-3242. DOI: https://doi.org/10.35870/ijsecs.v3i3.1847.

Selection of High School Majors using a Decision Support System for Students at SMPN 210 Jakarta Using the Profile Matching Method

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Received: 17 November 2023; Accepted: 28 November 2023; Published: 20 December 2023.

Abstract: The selection of a high school major is a pivotal decision that profoundly impacts a student's prospects. This research endeavors to enhance this decision-making process by introducing a Decision Support System (DSS) employing the Profile Matching Method at SMPN 210 Jakarta. The Profile Matching Method is meticulously crafted to offer personalized major recommendations based on students' interests, skills, and aspirations. Employing a quantitative approach, the study scrutinizes student data alongside major prerequisites to formulate a streamlined DSS. The research findings underscore that the application of the Profile Matching Method within a DSS empowers students to make well-informed decisions, streamlines the major selection process, and optimizes the utilization of educational resources within SMPN 210 Jakarta. This implementation holds the potential to foster positive transformations in high school major selections and fortify educational advancements at SMPN 210 Jakarta.

Keywords: High School Major Selection; Decision Support System (DSS); Profile Matching Method.

1. Introduction

Choosing the right major in high school is an important moment in a student's career and influences their future career path. These decisions not only impact individual students, but also play a role in their overall academic success and achievement of educational goals [1]. Choosing the right major influences students' academic success and influences their future career paths. Several studies have used methods such as Simple Additive Weighting (SAW) in selecting majors in high school, but there is still potential for using the Profile Matching method in determining student majors [2].

Several studies have used the Profile Matching method in selecting majors in high school, but further research can be carried out to optimize this method in selecting student majors [3]. Decision support systems (DSS) can be used to assist students in choosing a major that suits the student's abilities, talents, and interests. The Profile Matching method has the potential to be an effective tool in DSS for selecting students' majors in high school. By using this method, students can determine the placement that best suits each student's criteria and performance, which will influence their overall academic success and achievement of their educational goals. The decision support system (DSS) for high school entrance selection is a tool that assists schools in determining the selection of new students based on various criteria, such as grades and zoning. The system aims to facilitate the decision-making process and generate rankings on all alternatives using methods like the Simple Additive Weighting (SAW) method [4].

High school students rely on academic advisors, standardized tests, and personal intuition to choose a major. However, this approach may not always consider diverse talents, interests, and career potential [5]. Empowering students in choosing a high school major, it is important to provide them with tools that enable them to make informed decisions, considering their individual profile, strengths, and aspirations. Some approaches that can be used to empower students in choosing a high school major include: 1) Students can utilize online resources to obtain information about the various

majors available, subjects to be studied, career prospects, and suitability to individual interests and strengths; 2) Training programs can be developed to assist students in identifying their interests, strengths, and aspirations related to the various majors available; 3) Educational technology can be used to provide easy access to the data necessary for informed decision making, enabling students to make choices that suit their needs and aspirations; 4) An in-depth analysis of school needs can help in understanding student preferences regarding the majors offered. By utilizing online resources, training programs, educational technology, and in-depth analysis of school needs, students can be empowered to make informed decisions about their high school major, considering their individual profile, strengths, and aspirations.

2. Research Method

2.1. Research Stages

The stages carried out in this research include problem formulation analysis, problem solving analysis, system design, system implementation and drawing conclusions.The title of the article must be written briefly and clearly and must indicate precisely the problem to be raised, not to allow for diverse interpretations, written in lowercase and in the middle of the paragraph. Article titles may not contain abbreviations that are not commonly used. The main idea of the article put forward first and then followed by other explanations.

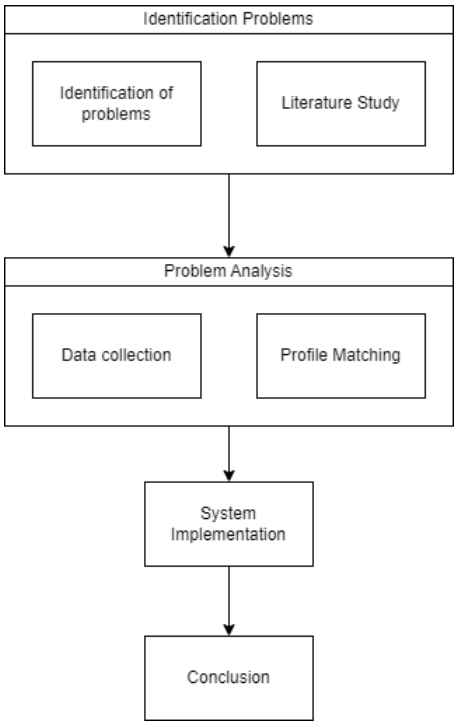

Figure 1. Research Stages

2.2. Problem Solving Analysis

1) Data collection
   This stage is carried out by collecting data on what criteria are used for the process of selecting majors in junior high schools.
2) Profile Matching
   The method used in creating a decision support system is the Profile Matching method. This method is a simple decision-making method in a decision support system by comparing the gap between alternative values and criteria.
3) System Implementation
   In this stage, the author implements the profile matching method into the decision support system in accordance with the problem-solving analysis.
4) Conclusion
   Drawing conclusions is an important part of research activities because it is the conclusion of the research. The aim is to analyze, look for meaning from existing data so that it can be found in the research that has been carried out.

2.3 Algorithm

In the Profile Matching method, this method is a simple decision-making method in a decision support system by comparing the gap between alternative values and criteria. This algorithm is a general guide, in its implementation the algorithm can be adapted to the needs of the specific context of the major decision support system used. From this explanation, the image can be explained into a flowchart like the following image. The introduction must contain (in sequence) a general background, a previous literature review (state of the art) as a basis for the statement of scientific renewal of the article, a gap analysis of what has been produced by previous research, and a statement of the importance of the research carried out. At the end of the introduction the explicit purpose of the article should be stated. In the scientific article format, it is not permissible to review the literature as in the research report, but it is manifested in the form of a previous literature review (state of the art) to show what the focus of these studies is, what is lacking, why this research is important and the research objectives The writer did. The author must avoid duplicating / repeating unnecessary explanations of his own work / others that have been published.

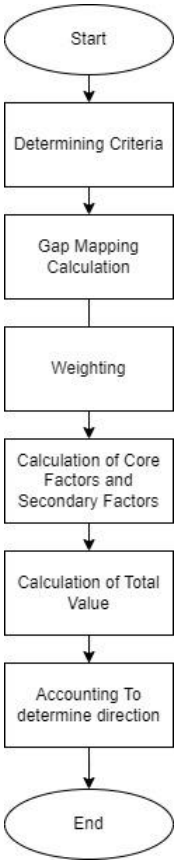

Figure 2. Flowchart for the Profile Matching Method

Explanation:

1) Determine Criteria
   The first step to perform the calculation process using the Profile Matching method is to determine the criteria to consider relevant factors in the decision-making process. These criteria will be used as a basis to find the weight of each criterion. Here are the criteria from the research, namely academic value, psychotest value, interest, and from parents.
2) Gap Mapping Calculation
   At this stage, the value weight for each aspect will be determined using gap weights.

$$Gap = Student\ Profile - Department\ profile$$

3) Weighting.
   The input from this weighting process is the difference between the student profile and the major profile. The differences obtained can be weighed up according to the benchmark values in table 1.

Table 1. Gap Value Weights

No	Difference	Weight
1	0	5
2	1	4.5
3	-1	4
4	2	3.5
5	-2	3
6	3	2.5
7	-3	2
8	4	1.5
9	-4	1

4) Calculation of core factors and secondary factors
Core Factor (Main Factor) The Core factor is the aspect (competency) that stands out/is most needed. To calculate the core factor, use the formula:

$$NCF = \sum NC \sum IC$$

Secondary factors are items other than the aspects in the core factor. To calculate the secondary factor, use the formula:

$$NSF = \sum NS / \sum IS$$

5) Calculation of Total Value
To calculate the total value of each aspect, the formula is used:

$$N = (X)\% + (X)\% \, NSF$$

6) Calculations to Determine Major
The results of the major use the profile matching method. After the calculations are carried out, you will get the results of the major based on the calculation shown by the formula:

$$Ranking = (X)\% \, NK1 + (X)\% \, NK$$

3. Result and Discussion

3.1 Results
3.1.1 Manual Calculation Using the Profile Matching Method
The following is a manual calculation using research data using the Profile Matching method. Profile Matching method calculation steps:

Table 2. Criteria Table

Code	Criteria
C1	Matematika
C2	IPA
C3	IPS
C4	PPKN
C5	Bahasa Indonesia
C6	Bahasa Inggris

Table 3. Table of Standard Values for Each Department

Major	C1	C2	C3	C4	C5	C6
IPA	8	8	6	6	6	6
IPS	6	6	8	8	6	6
Bahasa	6	6	6	6	8	8

Table 4. Student Criteria Table

Student	C1	C2	C3	C4	C5	C6
S1	7	8	8	9	6	8
S2	7	8	8	6	6	7
S3	7	8	8	9	9	9
S4	8	9	8	8	6	9
S5	7	7	8	7	6	8
S6	8	7	8	8	6	8
S7	8	9	8	8	7	8
S8	7	8	8	8	7	8
S9	8	7	8	8	7	8
S10	7	9	8	8	7	8

Table 5. Gap Value Weight Table

Gap	Weight
0	5
1	4.5
-1	4
2	3.5
-2	3
3	2.5
-3	2
4	1.5
-4	1

Calculate the Core Factor and Secondary Factor Values for Each Department

1) Calculation of NCF and NSF for IPA majors

Table 6. NCF and NSF Calculation Table for Science Department

Student	Core Factor Value	Secondary Factor Value	Total
S1	2.742	0	2.742
S2	3.150	0	3.150
S3	2.333	0	2.333
S4	2.800	0	2.800
S5	2.858	0	2.858
S6	2.858	0	2.858
S7	2.858	0	2.858
S8	2.800	0	2.800
S9	2.800	0	2.800
S10	2.742	0	2.742

2) Calculation of NCF and NSF for Social Sciences majors

Table 7. NCF and NSF Calculation Table for Social Sciences Department

Student	Core Factor Value	Secondary Factor Value	Total
S1	3.033	0	3.033
S2	2.975	0	2.975
S3	2.625	0	2.625
S4	2.742	0	2.742
S5	3.092	0	3.092
S6	3.092	0	3.092
S7	2.800	0	2.800
S8	3.033	0	3.033
S9	3.033	0	3.033
S10	2.917	0	2.917

3) NCF and NSF calculations for Language majors

Table 8. NCF and NSF Calculation Table for Language Department

Student	Core Factor Value	Secondary Factor Value	Total
S1	2.567	0	2.567
S2	2.742	0	2.742
S3	2.683	0	2.683
S4	2.392	0	2.392
S5	2.917	0	2.917
S6	2.683	0	2.683
S7	2.567	0	2.567
S8	2.800	0	2.800
S9	2.800	0	2.800
S10	2.683	0	2.683

Determine the Recommendation Value of the Department from the Value of the Largest Department

Table 9. NCF and NSF Calculation Table for Language Department

No	Student	Department Recommendations
1	S1	IPS
2	S2	IPA
3	S3	Bahasa
4	S4	IPA
5	S5	IPS
6	S6	IPS
7	S7	IPA
8	S8	IPS
9	S9	IPS
10	S10	IPS

Based on the results of manual calculations using the Profile Matching method with calculations using the Decision Support System that has been built, the same major selection results were obtained. It can be concluded that the system built can run well.

3.2. Discussion

We explore a comprehensive analysis of the results obtained from both manual calculations using the Profile Matching method and the Decision Support System (DSS) that has been built. This analysis allows us to explore the implications of these findings and their significance in the context of major selection within an educational framework. One important observation from these results is the consistency between the main recommendations calculated manually using the Profile Matching method and the recommendations generated by the Decision Support System. This alignment shows that the system is functioning effectively in replicating manual calculations. This consistency serves as strong validation of the accuracy and reliability of the DSS in assisting students in making major selection decisions. The Profile Matching Method, used both manually and in DSS, has demonstrated its efficiency in assessing and matching student profiles to departmental criteria. This method allows for a systematic evaluation of factors, such as academic performance and individual preferences, thereby contributing to well-informed primary recommendations. Its reliability in providing consistent results further underscores its potential to serve as a valuable tool in the educational field. One of the advantages of the Profile Matching method proven in this research is its adaptability to certain contexts. Although the tables and calculations presented represent a standard approach, it is important to note that these methods can be adapted to fit the unique needs of various educational institutions and major selection criteria. This adaptability makes it a versatile tool for schools aiming to improve the primary selection process. The main goal of implementing a Decision Support System for major selection is to empower students to make informed decisions that align with their talents and aspirations. The results of this research confirm that such a system, using the Profile Matching method, has the potential to guide students towards majors that suit their individual profiles. This approach helps bridge the gap between students' diverse talents and the educational opportunities available. Although this research has provided valuable insights into the Profile Matching method and its application in primary selection, there is still room for further investigation and improvement. Future research could explore the integration of additional criteria or refinement of existing weighting systems to increase the precision of key recommendations. Additionally, the scalability of Decision Support Systems to accommodate larger student populations requires attention in future research efforts. The method's consistent results, adaptability, and potential to empower students underscore its benefits in helping students make informed choices regarding their educational paths.

In addition, this research lays the foundation for future improvements and improvements in order to create a more effective major selection system in educational institutions.

4. Related Work

Research in the field of decision support systems for selecting education majors reveals findings and methodology with research topics. One study conducted by Tamam, Taufiq, and Amri (2011) introduced a decision support system that utilizes fuzzy logic to address the intricacies of student preferences and aptitudes, emphasizing the importance of considering varying levels of interest and proficiency in certain subjects when choosing. main [1]. Al Fath Riza (2017) explored the application of the Simple Additive Weighting (SAW) method for major selection in secondary schools, by underlining the importance of quantifying factors in the decision-making process [2]. Muhas (2019) explored the application of the Profile Matching and Weight Product methods for student internship placement in vocational schools, aligning with our focus on the Profile Matching method and highlighting the importance of matching student profiles to certain criteria when making educational decisions [3]. Zubaedah and Prasetyo (2022) developed a decision support system for secondary school entrance selection, emphasizing the role of decision support systems in simplifying the selection process and offering insight into its potential benefits [4]. In addition, Wulandari (2013) investigated the reasons behind students' choice of majors in vocational schools, highlighting the human factors involved in decision making, thus complementing our quantitative approach [5]. Collectively, these studies lay the foundation for our research, showcasing a variety of methods and approaches that inform the development of effective Decision Support Systems with Profile Matching methods.

5. Conclusion

Through this research, it can be concluded that the implementation of a Decision Support System (SPK) with the Profile Matching Method in the process of majoring in high school majors at SMPN 210 Jakarta has great potential to increase efficiency and effectiveness in student decision making regarding major selection. The implementation of SPK using the Profile Matching Method gives SMPN 210 Jakarta students a tool that can empower them to make more informed major selection decisions. Students can more effectively identify majors that match their interests, skills and aspirations. The Profile Matching method helps optimize the majoring process by providing recommendations based on more holistic data analysis, involving not only academic aspects but also student interests and potential. SPK with the Profile Matching Method offers a personal approach and suits the unique needs of each student, avoiding choosing a major that is one size fits all.

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