



Decision Support System for Selecting the Best School Management Software Using MOORA (Case Study: Vocational High School)

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Abstract. The rapid development of information technology has prompted educational institutions, including vocational high schools, to adopt school management software in order to improve operational efficiency, administrative transparency, and the overall quality of educational services. However, selecting the appropriate management software is not an easy task, given the numerous product alternatives available in the market, each with its own advantages, disadvantages, and distinct characteristics. Inaccurate software selection can lead to inefficient use, budget wastage, and even obstacles in technology implementation within the school environment. Therefore, a systematic and objective approach is required in decision-making. This study aims to develop a Decision Support System (DSS) based on the MOORA method that can be used by schools to evaluate and determine the best school management software based on relevant criteria, such as feature completeness, data security, price, ease of use, and technical support. The MOORA method was chosen for its ability to handle multi-criteria problems with transparent and measurable results. Based on the results of the analysis using the MOORA method, it was found that of the four school management software alternatives evaluated based on five criteria, alternative A3 had the highest Y_i preference value of 32,5334, followed by A4 (29,9665), A2 (28,8545), and A1 (27,7229). The normalization and weighting process successfully converted the initial data into standardized values, enabling objective comparisons between alternatives. Therefore, it can be concluded that A4 is the best school management software and the most suitable choice in this study.

Keywords: DSS, MOORA, School Management Software, Vocational High School

1. INTRODUCTION

Vocational High Schools are educational institutions that focus on skills and work readiness, so they are highly affected by the development of information technology. To meet the demands of the times, Vocational High Schools must quickly adapt to technological innovations, from adapting industry-based curriculum, implementing digital education, to modernizing school management systems. This digital transformation is crucial to improve the quality of education and work efficiency. One form of such transformation is the use of school management software. This software integrates various activities such as student administration, finance, academic data and automated reports. The goal is to create an efficient, transparent and responsive work environment. The use of digital systems also reduces manual workload, speeds up data input, and facilitates decision-making through valid real-time information. However, the selection of school management software should not be haphazard. Mistakes in choosing school management software can lead to budget waste, system incompatibility, and data security risks. Therefore, schools must be selective and wise so that digital transformation runs optimally without causing new problems. To avoid this, the school management software process should be done systematically and based on a thorough needs analysis. This is where Decision Support Systems (DSS) play an important role. DSS is a computer-based system that can be used to assist decision makers in determining the best option by considering various criteria [1], [2].

One of the effective DSS methods is MOORA (Multi-Objective Optimization on the basis of Ratio Analysis) [3], [4], [5]. This method allows objective and efficient comparison of alternatives based on a number of criteria, and provides easy-to-understand results as a basis for decision making [6]. In previous research, MOORA has been widely applied in solving complex decision making, including research by Hana Rina Maryen, et al. (2023), who applied the MOORA method in the selection of Cafes in Jayapura. In the results of this study, it was concluded that the MOORA method can provide accurate choice recommendations to help decision makers in solving the problem at hand [7]. Then, research by Teguh Bagus Wicaksono, et al. (2024), which applies the MOORA method in selecting alternatives that are eligible to receive scholarships. The results of the study concluded that A9, which is the alternative with the highest value (0.20813), is recommended as the most worthy alternative to receive a



scholarship [8]. Furthermore, research by Gede Surya Mahendra, et al. (2025), which applied the MOORA method in a tourist spot recommendation system. The results of the study concluded that MOORA was able to provide accurate recommendations to help tourists find the most desired tourist attractions in Klungkung Regency [9].

2. METHODOLOGY

2.1 Research Stages

The research stages for problem solving in selecting the best school management software using the MOORA method in this study can be seen in Figure 1 below:

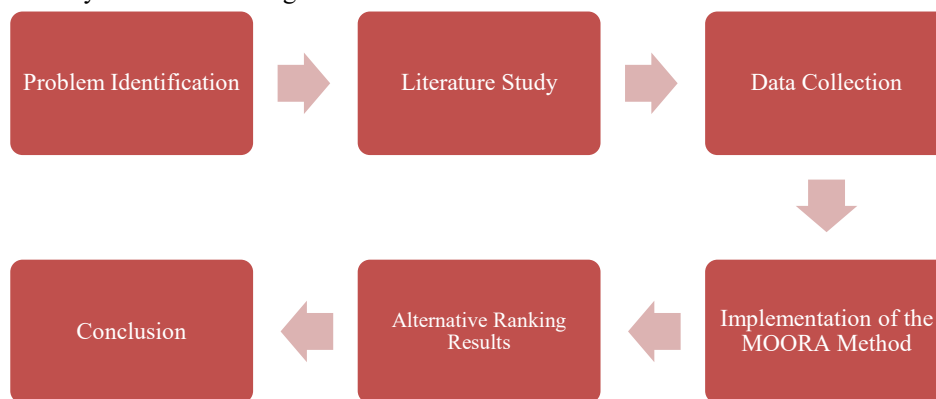


Figure 1. Research Stages

2.2 Decision Support System

Decision Support System (DSS) is a computer-based technology designed to accelerate and simplify the decision-making process through the utilization of relevant data, models, and analytical tools. By integrating available information, DSS can improve efficiency and accuracy in strategic decision making at various levels of the organization [10], [11], [12].

2.3 Multi-Objective Optimization on the basis of Ratio Analysis (MOORA)

MOORA is one of the approaches in Multi-Attribute Decision Making (MADM), which was first introduced by Brauers and Zavadskas. MOORA is known for its high selection ability in evaluating and differentiating alternatives based on a number of relevant criteria. The main advantage of this method lies in its ability to set objectives objectively for each assessment criteria used in the decision-making process [13], [14].

MOORA has five systematic stages to solve decision-making problems, both semi-structured and unstructured. The five stages form a comprehensive framework in identifying, evaluating, and determining the best alternative based on a number of criteria. The stages in the MOORA method can be seen in Figure 2 below [15], [16]:

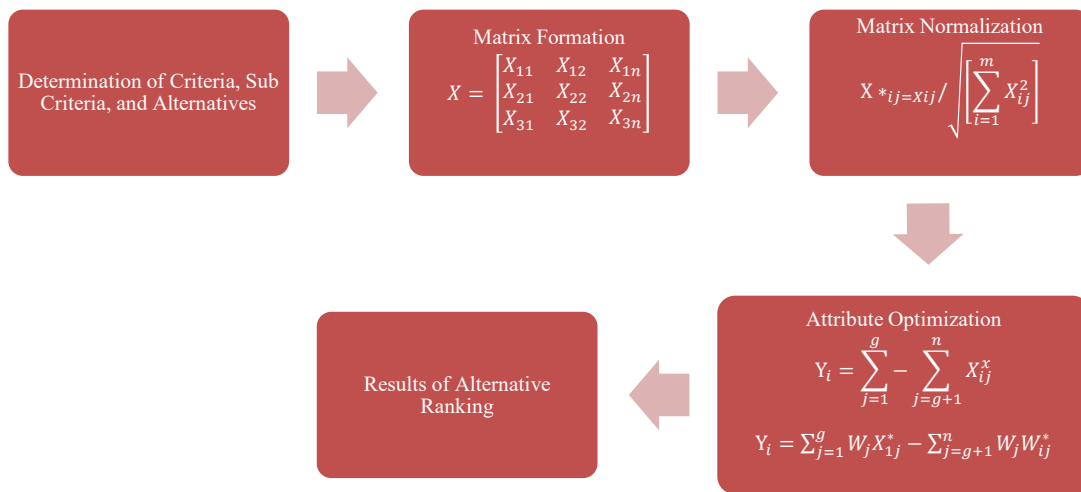


Figure 2. Stages of MOORA Method

2.4 Research Data

Research data for the best school management software selection test using the MOORA method in this study can be seen in the following table:

Table 1. Criteria Data

Criteria	Description	Criteria Weight	Sub Criteria	Sub Criteria Weight
Feature Completeness (C1)	Benefit	25	Complete	39
			Enough	34
			Less	27
Data Security (C2)	Benefit	22	High	38
			Medium	34
			Low	28
Price (C3)	Cost	20	High	37
			Medium	34
			Low	29
Ease of Use (C4)	Benefit	18	Low	37
			Medium	33
			High	30
Technical Support (C5)	Benefit	15	Good	38
			Enough	33
			Bad	29

Table 2. Alternative Data

Alternative	Criteria				
	C1	C2	C3	C4	C5
A1	Less	High	Medium	High	Bad
A2	Complete	Low	High	Medium	Good
A3	Enough	High	Low	Low	Enough
A4	Complete	Medium	High	High	Good



3. RESULTS AND DISCUSSION

3.1 Matrix Formation

The results of matrix formation for selecting the best school management software using the MOORA method in this study can be seen in the following description:

$$X \begin{bmatrix} 27 & 38 & 34 & 37 & 29 \\ 39 & 28 & 37 & 33 & 38 \\ 34 & 38 & 29 & 37 & 33 \\ 39 & 34 & 37 & 30 & 38 \end{bmatrix}$$

3.2 Matrix Normalization

The results of matrix normalization for selecting the best school management software using the MOORA method in this study can be seen in the following description:

$$\begin{aligned} C1 &= \sqrt{27^2 + 39^2 + 34^2 + 39^2} \\ &= \sqrt{729 + 1521 + 1156 + 1521} \\ &= \sqrt{4927} \\ &= 70,1925922 \end{aligned}$$

$$A_{11} = 27/70,1925922 = 0,3847$$

$$A_{21} = 39/70,1925922 = 0,5556$$

$$A_{31} = 34/70,1925922 = 0,4844$$

$$A_{41} = 39/70,1925922 = 0,5556$$

$$\begin{aligned} C2 &= \sqrt{38^2 + 28^2 + 38^2 + 34^2} \\ &= \sqrt{1444 + 784 + 1444 + 1156} \\ &= \sqrt{4828} \\ &= 69,48381106 \end{aligned}$$

$$A_{11} = 38/69,48381106 = 0,5469$$

$$A_{21} = 28/69,48381106 = 0,4030$$

$$A_{31} = 38/69,48381106 = 0,5469$$

$$A_{41} = 34/69,48381106 = 0,4893$$

$$\begin{aligned} C3 &= \sqrt{34^2 + 37^2 + 29^2 + 37^2} \\ &= \sqrt{1156 + 1369 + 841 + 1369} \\ &= \sqrt{4735} \\ &= 68,81133628 \end{aligned}$$

$$A_{11} = 34/68,81133628 = 0,4941$$

$$A_{21} = 37/68,81133628 = 0,5377$$

$$A_{31} = 29/68,81133628 = 0,4214$$

$$A_{41} = 37/68,81133628 = 0,5377$$

$$\begin{aligned} C4 &= \sqrt{37^2 + 33^2 + 37^2 + 30^2} \\ &= \sqrt{1369 + 1089 + 1369 + 900} \\ &= \sqrt{4727} \\ &= 68,7531 \end{aligned}$$

$$A_{11} = 37/68,7531 = 0,5382$$

$$A_{21} = 33/68,7531 = 0,4800$$

$$A_{31} = 37/68,7531 = 0,5382$$

$$A_{41} = 30/68,7531 = 0,4363$$

$$\begin{aligned} C5 &= \sqrt{29^2 + 38^2 + 33^2 + 38^2} \\ &= \sqrt{841 + 1444 + 1089 + 1444} \\ &= \sqrt{4818} \\ &= 69,4118 \end{aligned}$$

$$A_{11} = 29/69,4118 = 0,4178$$

$$A_{21} = 38/69,4118 = 0,5475$$

$$A_{31} = 33/69,4118 = 0,4754$$



$$A_{41} = 38/69,4118 = 0,5475$$

$$X_{ij} = \begin{bmatrix} 0,3847 & 0,5469 & 0,4941 & 0,5382 & 0,4178 \\ 0,5556 & 0,4030 & 0,5377 & 0,4800 & 0,5475 \\ 0,4844 & 0,5469 & 0,4214 & 0,5382 & 0,4754 \\ 0,5556 & 0,4893 & 0,5377 & 0,4363 & 0,5475 \end{bmatrix}$$

3.3 Attribute Optimization

The results of attribute optimization for selecting the best school management software using the MOORA method in this study can be seen in the following description:

C1

$$A_{11} = 0,3847 * 25 = 9,6175$$

$$A_{21} = 0,5556 * 25 = 13,89$$

$$A_{31} = 0,4844 * 25 = 12,11$$

$$A_{41} = 0,5556 * 25 = 13,89$$

C2

$$A_{12} = 0,5469 * 22 = 12,0328$$

$$A_{22} = 0,4030 * 22 = 8,866$$

$$A_{32} = 0,5469 * 22 = 12,0328$$

$$A_{42} = 0,4893 * 22 = 10,7646$$

C3

$$A_{13} = 0,4941 * 20 = 9,882$$

$$A_{23} = 0,5377 * 20 = 10,754$$

$$A_{33} = 0,4214 * 20 = 8,428$$

$$A_{43} = 0,5377 * 20 = 10,754$$

C4

$$A_{14} = 0,5382 * 18 = 9,6876$$

$$A_{24} = 0,4800 * 18 = 8,64$$

$$A_{34} = 0,5382 * 18 = 9,6876$$

$$A_{44} = 0,4363 * 18 = 7,8534$$

C5

$$A_{15} = 0,4178 * 15 = 6,267$$

$$A_{25} = 0,5475 * 15 = 8,2125$$

$$A_{35} = 0,4754 * 15 = 7,131$$

$$A_{45} = 0,5475 * 15 = 8,2125$$

$$X_{wj} = \begin{bmatrix} 9,6175 & 12,0328 & 9,882 & 9,6876 & 6,267 \\ 13,89 & 8,866 & 10,754 & 8,64 & 8,2125 \\ 12,11 & 12,0328 & 8,428 & 9,6876 & 7,131 \\ 13,89 & 10,7646 & 10,754 & 7,8534 & 8,2125 \end{bmatrix}$$

After obtaining the X_{wj} matrix value, the next stage is the process of calculating the Y_i preference value. The results of the calculation of the preference value of Y_i for A1 to A4 can be seen in the following description:

$$Y_i A1 = 9,6175 + 12,0328 - 9,882 + 9,6876 + 6,267 \\ = 27,7229$$

$$Y_i A2 = 13,89 + 8,866 - 10,754 + 8,64 + 8,2125 \\ = 28,8545$$

$$Y_i A3 = 12,11 + 12,0328 - 8,428 + 9,6876 + 7,131 \\ = 32,5334$$

$$Y_i A4 = 13,89 + 10,7646 - 10,754 + 7,8534 + 8,2125 \\ = 29,9665$$

3.4 Results of Alternative Ranking

After the process of calculating the preference value Y_i using the MOORA method is completed, the next step is to rank the available alternatives. This ranking is based on the amount of preference value Y_i obtained by



each alternative. The results of the preference value calculation are then used as a basis for determining the priority order of alternatives, as presented in Table 3 below.

Table 3. Results of Alternative Ranking

Ranking	Alternative	Y_i
1	A3	32,5334
2	A4	29,9665
3	A2	28,8545
4	A1	27,7229

4. CONCLUSION

Based on the results of the analysis using the MOORA method, it was found that of the four school management software alternatives assessed based on five criteria, alternative A3 had the highest Y_i preference value of 32,5334, followed by A4 (29,9665), A2 (28,8545), and A1 (27,7229). The normalization and weighting process successfully converts the initial data into standardized values that allow objective comparison between alternatives. Therefore, it can be concluded that A4 is the best school management software and the most feasible to choose in this study.

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