Decision Support System for Laboratory Computer Selection for Procurement Using the MOORA Method at SMK Negeri 2 Ulu Moro'o

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Abstract

In the procurement of goods, SMK Negeri 2 Ulu Moro'o still selects laboratory computers manually without clear criteria, making it subjective and difficult to justify. It is very important to consider the situation of schools in the island region because they have limited BOSP funds, 2,200 watts of electrical power, and their location is far from service centers. The objective of this research is to create a web-based decision support system used for the selection of laboratory computers. The multi-objective optimisation method based on the ratio analysis (MOORA) is the foundation of this method. To evaluate, seven criteria are used: price, processor performance, RAM capacity, storage capacity, warranty and after-sales service, power consumption, and local content. Alternative data is obtained from the providers' offers, while the school assigns weights to the criteria through interviews. The system was built using the Waterfall model, modelled using UML, and tested through black-box testing and manual calculation accuracy tests. The results show that A4 is the best option with an optimisation value of 0.1775, followed by A3 with a value of 0.1558, and the cheapest option is ranked last. The top ranking remains stable, according to the sensitivity test on four weight scenarios. There is evidence that the main factor distinguishing the top two choices is the amount of power used. Objective, transparent, and recorded recommendations are produced by a system built to support accountable procurement in educational units.

Keywords: *Decision Support System, MOORA, Computer Selection, Procurement, Vocational School*

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Introduction

Vocational High School (SMK) is an educational program aimed at preparing students to work in specific fields [1]. To achieve this goal, learning in vocational schools emphasises practices that align with the needs of the workforce. This is in line with the vocational school revitalisation policy, which demands an improvement in the quality and competitiveness of graduates [2]. Computers have become essential tools for almost all vocational programs in the era of digital transformation. They are used for learning administration, vocational practice, computer-based assessments, and skills competency tests. As a result, the availability of qualified computer laboratories is an important factor in determining the quality of the learning process and outcomes in vocational schools.

National standards regulate the provision of learning facilities. The Minister of Education, Culture, Research, and Technology Regulation [3] establishes standards for all educational institutions, including vocational high schools. The Director General of Vocational Education Regulation [4] regulates the technical management of vocational high school facilities. This regulation covers the stages of planning, procurement, and development of facilities and infrastructure. Therefore, the purchase of laboratory computers is part of the school's efforts to meet the requirements for learning facilities and not just an expense.

Procurement of goods from public funds, especially the Education Operational Assistance Fund, includes the purchase of computers by public schools. The Regulation of the Minister of Education and Culture [5] regulates the management of these funds, and the Regulation of the Minister of Education, Culture, Research, and Technology [6] on Guidelines for Procurement of Goods/Services by Educational Units regulates the spending methods. Presidential Regulation [7], as last amended, regulates the procurement of government goods/services. Each regulation demands procurement that is effective, efficient, transparent, and accountable. This is done so that schools can demonstrate that the items they choose are most suitable for their needs and budget, and can be accountable for the reasons they selected those items.

Based on initial observations, the selection of computers for procurement at SMK Negeri 2 Ulu Moro'o is still done manually through conversations and comparison of offers, without clear and documented criteria used for evaluation. Decisions can be made subjectively based on findings or interviews with the principal, vice principal of facilities, or laboratory head. Things like the number of units, the condition of the damaged units, and the selection method currently done manually can influence this decision. Computers can be purchased at an affordable price but with poor specifications, or they may have high specifications but exceed the available budget and power supply. Moreover, the principle of procurement accountability requires supervisors to be objectively responsible for the reasons behind the selection.

Decision Support System (DSS) can address selection problems with multiple alternatives and criteria. DSS is a computer-based information system that helps decision-makers solve semi-structured problems with data and models. [8] state that DSS does not replace the role of decision-makers, but enhances the quality of decisions through systematic calculations. The Multi-Criteria Decision Making (MCDM) problem in computer selection involves benefit criteria, such as processor, RAM, storage, and warranty, as well as cost criteria, such as price and power consumption. The Multi-Objective Optimisation Based on Ratio Analysis (MOORA) method proposed [9] aims to handle both types of criteria simultaneously by normalising the ratio and reducing the cost value from the benefit value. This makes the calculations transparent and the results easy to explain to non-technical people.

Several studies have shown that MOORA is effective in selecting computer devices. [10] created a decision support system for laptop selection at Master Komputer store and found a 100% match in ten testing scenarios. On the other hand, [11] used MOORA to rank alternative laptop choices based on relative performance values. [12] used a similar approach to select high-end laptop specifications at UD. Griya IT; [13] chose MacBook for engineering students; and [14] used AHP and MOORA to provide laptop recommendations. [15] shows that MOORA

can assist in initially subjective decisions in the school environment, such as selecting the best teachers and staff at SMP Negeri Palipi. In the meantime, the decision maker's weights and the optimisation outcomes of the MOORA method are combined using the MOORSA method. This work creates a Decision Support System (DSS) that employs the MOORA and MOORSA methodologies in addition to other well-known techniques like SAW, AHP, and TOPSIS to aid in the decision-making process. The MOORA approach, which is renowned for its accuracy in managing several criteria [16].

However, this research usually focuses on individual consumers or computer stores using individual preferences. Research applying MOORA for laboratory computer procurement by public schools, with typical criteria such as alignment with vocational program needs, power consumption, Fund limitations, and the availability of warranty and after-sales service in island regions, has not been conducted at SMK Negeri 2 Ulu Moro'o and Nias Barat Regency as far as the author has found. Therefore, this research designs and builds a decision support system based on the MOORA method that can rank computer alternatives consistently, objectively, and documented as a basis for procurement planning and accountability.

Literature Review

2.1 Decision Support System

A Decision Support System is an interactive, flexible, and customisable computer-based information system designed to help solve unstructured or semi-structured management problems. States that DSS functions to enhance the effectiveness of decision-making, not to replace the judgement of decision-makers. [17] add that DSS is designed to improve the decision-maker's ability in semi-structured situations, while humans remain responsible for the final decision.

DSS consists of several subsystems, (1) Data management subsystem, which is a database that stores relevant data, such as computer alternative data, criteria, and weights. (2) Model management subsystem, which is a quantitative model for data processing. The MOORA method. (3) is used in this research. The user interface subsystem includes the media used by users to interact with the system, such as web pages used to manage data and view ranking results. (4) Knowledge-based subsystem (optional): a component that can stand alone or support other subsystems.

The design of the developed system architecture is based on the mapping of these components.

2.2 Criteria Decision Making (MCDM)

The Multi-Criteria Decision Making (MCDM) approach is a way to select the best alternative from a set of alternatives by considering a number of criteria. Hwang and Yoon (1981) divided MCDM into two groups. Multi-Objective Decision Making (MODM) deals with design problems with unlimited alternatives, while Multi-Attribute Decision Making (MADM) deals with design problems by selecting from a limited and known set of alternatives.

The MADM problem consists of three main components: alternatives, criteria (attributes), and the weight of importance for each criterion. Criteria are divided into two categories: benefit criteria, which indicate that higher values represent higher quality, and cost criteria, which indicate that lower values represent lower quality. Simple Additive Weighting (SAW), Weighted Product (WP), TOPSIS, AHP, and MOORA are commonly used MADM methods. The selection of laboratory computers is a MADM problem because the alternatives are limited, namely the types of computers offered by the suppliers, and the criteria are conflicting. Higher specifications are usually accompanied by higher prices and power consumption. Therefore, an approach is needed that can balance profit standards and costs simultaneously.

2.3 MOORA Method

Created by Brauers and Zavadskas (2006), Multi-Objective Optimisation based on Ratio Analysis (MOORA) was first used to address privatisation issues in transition economies.

Furthermore, this approach was extended to MULTIMOORA by adding the reference point approach and the full multiplicative. The core of MOORA is to optimise various objectives simultaneously through ratio analysis. [17] explain several advantages of MOORA: its calculations are simple, stable, and robust, it does not require advanced mathematical skills, and it is very selective in choosing alternatives. Hasibuan, Prahutama, and Ispriyanti (2019) compared MOORA and TOPSIS using sensitivity analysis to assess the stability of the results. With an average result change of only 1.61% and a TOPSIS change of 7.96%, MOORA was deemed more appropriate for this case.

The steps of MOORA are as follows, based on Brauers and Zavadskas (2006). Step One: Identify alternatives, criteria, types of criteria (benefit/cost), and weights (w_j). The total weight must equal 1. Step two: Construct a decision matrix with m criteria and n alternatives, where the value of the i-th alternative on the j-th criterion is called x_ij.

$$X = \begin{bmatrix} x_{11} & x_{12} & \cdots & x_{1n} \\ x_{21} & x_{22} & \cdots & x_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ x_{m1} & x_{m2} & \cdots & x_{mn} \end{bmatrix}$$

Step three is matrix normalisation, where each value is divided by the square root of the sum of the squares of all alternative values according to the same standard.

$$x_{ij}^{*} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^{m} x_{ij}^{2}}}$$

Step 4 is to find the optimisation value (y_i). The normalised weighted values on the benefit criteria (j = 1 to g) are collected and then subtracted from the normalised weighted values on the cost criteria (j = g + 1 to n).

$$y_i = \sum_{j=1}^{g} w_j \, x_{ij}^{*} - \sum_{j=g+1}^{n} w_j \, x_{ij}^{*}$$

Step Five: Ranking Alternatives with the highest y_i values sorted from smallest to largest. The alternative with the highest y_i value is considered the best recommendation.

2.4 Procurement of Goods/Services by Educational Units

Presidential Regulation Number 16 of 2018, which has been amended by Presidential Regulation Number 12 of 2021 and Presidential Regulation Number 46 of 2025, regulates the procurement of goods and services by the government. One of the objectives of the second amendment is to expedite the procurement process and increase the use of domestic products. This is important because it can be one of the factors considered when choosing a computer. Minister of Education and Culture Regulation Number 14 of 2020 allows schools to use the School Procurement Information System (SIPLah) to purchase goods and services. However, Minister of Education, Culture, Research, and Technology Regulation Number 18 of 2022 replaces that regulation. According to this law, PBJ Satuan Pendidikan is an operation where educational units purchase goods and services through providers via an electronic system called the Satuan Pendidikan Procurement Information System. According to the Regulation of the Minister of Education for Primary and Secondary Education Number 8 of 2026, the procurement of goods and services is carried out according to the needs of the educational unit

as well as the school's budget and activity plan. This procurement is funded, among other sources, by the Fund.

Effective, effective, transparent, and accountable are the basic principles of this regulation. MOORA-based decision support systems can serve as an objective tool, as demonstrated by [17], because conventional procurement is prone to being less transparent, time-consuming, and potentially resulting in detrimental practices. SPK does not replace the procurement process regulated by law in this study. Before schools use the education unit procurement system for shopping, the system is responsible for the needs planning stage, where they determine the specifications and types of computers that are most suitable.

2.5 Computer laboratory as a Learning Tool

According to the Regulation of the Minister of Education, Culture, Research, and Technology Number 22 of 2023, facilities are anything that can be used as tools or devices to achieve learning objectives. Practical facilities in vocational schools must align with the expertise programs offered. The Regulation of the Director General of Vocational Education Number 33 of 2025 governs the management of these facilities from the planning stage to procurement and development. Laboratory computers must be selected based on learning needs, not specifications or the lowest price.

2.6 Criteria for selecting a computer

Previous research shows that considerations for choosing computer devices usually center around price and technical specifications. [10] used price, battery capacity, RAM, CPU, hard disc, and laptop size; Khan, Dermawan, Lestari, and Lubis (2026) used processor, RAM, SSD, and number of ports. The criteria are not suitable for school procurement because they are designed for individual customers.

The initial proposal of the research criteria is presented in Table 1. The principal, the vice principal in charge of facilities, and the head of the laboratory will be interviewed to determine the standards and values.

Table 1. Proposal for laboratory computer selection criteria

Code	Criteria	Type	Basis for selection
C1	Price per unit (Rp)	Cost	Fund Limitations; used by Rusadin et al. (2024) and Khan et al. (2026)
C2	Processor performance	Benefit	The need for practical skills programs; used by Rusadin et al. (2024)
C3	RAM Capacity (GB)	Benefit	Smooth application of practice; used in all reference studies
C4	Capacity and type of storage (GB, SSD/HDD)	Benefit	Speed and data space; used by Khan et al. (2026)
C5	Warranty period and after-sales service	Benefit	Island location far from the service center
C6	Electric power consumption (watts)	Cost	The school's electrical power is 2,200 watts.
C7	Value of the Domestic Component Level (TKDN)	Benefit	Direction of domestic product usage in Presidential Regulation Number 46 of 2025

Research Methodology

3.1 System Development Method

The systematic and sequential software development method is known as the Waterfall model, where each stage is completed before the next stage begins [16]. a). Analysis and definition of requirements b). System and software design c). Implementation and unit testing d). Integration and system testing e). Operation and maintenance.

Because the criteria, weights, and calculation flow of MOORA required by the system have been clearly defined since the beginning of the research, this model is suitable for this study. In addition, previous SPK research based on MOORA also used the Waterfall model; for example, [10], [17].

3.2 Black-box Testing

Black box testing examines the functionality of the software without inspecting the program's code structure. Testing is conducted by providing input and matching the results with the expected ones. This includes the login process, data input, and calculations. This test is used on the MOORA-based goods procurement decision support system. Additionally, as done [10], the accuracy of the system's calculations will be tested by comparing the results with manual calculations.

3.3 Framework of Thought

The framework of thought shows a logical flow of research, starting from the problem, the theory underlying the problem, the solution to the problem, and the expected results.

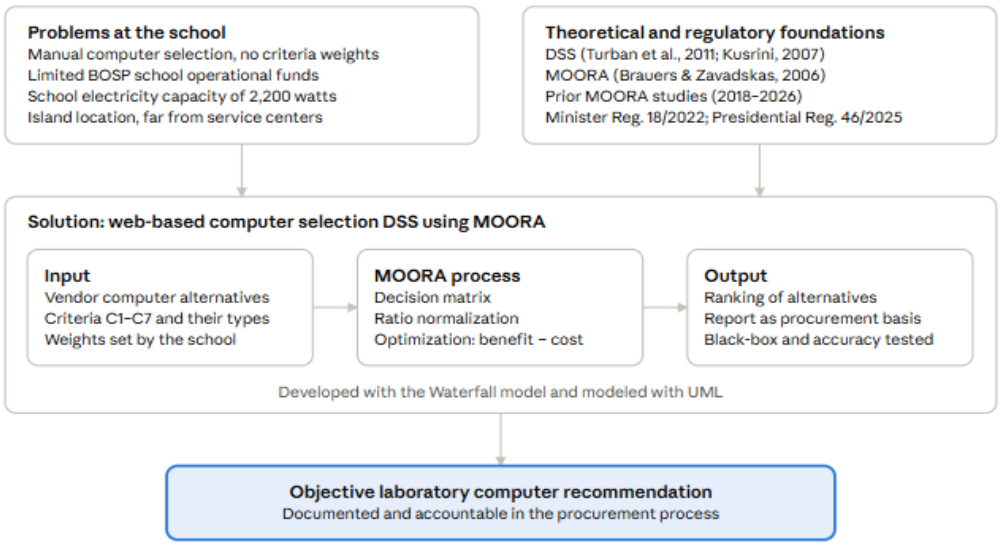


Figure 1. Research Conceptual Framework

The MOORA-based DSS is built on the problem and theory of school computer selection. The system processes choices, standards, and weights into rankings, resulting in objective and accountable computer recommendations when purchasing a computer.

The following image shows that this research is based on two complementary sources. The first source is practical problems at SMK Negeri 2 Ulu Moro'o. These include a limited budget for funds, an island location far from service centers, and the manual selection of computers without considering criteria. The second source is the theoretical and legal foundation. Previous research shows that MOORA can be used from 2018 to 2026, and there are regulations governing the procurement of goods in educational institutions (Permendikbudristek Number 18 of 2022; Presidential Regulation Number 46 of 2025). Both sources converge into one solution: a web-based computer selection decision support system using the MOORA method, modelled with UML and developed using the Waterfall model.

Results

4.1 Analysis of MOORA Method Calculations

This study presents the results of manual calculations using the Multi-Objective Optimisation based on Ratio Analysis (MOORA) method to determine the best laboratory computer alternatives for the procurement plan at SMK Negeri 2 Ulu Moro'o. These calculations follow the steps outlined by Brauers and Zavadskas (2006), namely the determination of alternatives and criteria, decision matrix preparation, ratio normalisation, optimisation value calculation, and ranking. The results of this manual calculation are also used as a reference to evaluate the accuracy of the decision support system that has been built.

4.2 Determination of Alternative

The type of computer offered by the provider is an alternative that meets the laboratory's minimum requirements. As shown in Table 2, this study uses five options coded A1 to A5.

Table 2. List of Computer Alternatives

Code	Alternative name	Keterangan
A1	PC Desktop Type 1	Mid-range processor, 1-year warranty with local service partner
A2	PC Desktop Type 2	Mid-range processor, 2-year warranty
A3	PC Desktop Type 3	Mid-range processor, 16 GB RAM, 3-year warranty
A4	PC All-in-One Type 4	High-end processor, 16 GB RAM, 3-year on-site warranty
A5	Mini PC Type 5	Mid-range processor, energy-efficient, 1-year warranty

4.3 Determination of Criteria, Types of Criteria, and Weights

The literature review refers to Table 3 for the criteria used. Each criterion is assigned its category, namely benefit (a higher level indicates higher quality) or cost (a lower level indicates lower quality), as well as its importance value. The results of the interviews with the principal, the vice principal in charge of facilities, and the head of the laboratory provided the scores.

Table 3. Criteria, Types, and Weights

Code	Criteria	Unit	Type	Weights (w)
C1	Price per unit	juta Rp	Cost	0,25
C2	Processor performance	scale 1–5	Benefit	0,20
C3	RAM capacity	GB	Benefit	0,15
C4	SSD storage capacity	GB	Benefit	0,10
C5	Warranty and after-sales service	scale 1–5	Benefit	0,10
C6	Electric power consumption	watt	Cost	0,10
C7	TKDN Value	%	Benefit	0,10
	Amount			**1,00**

The MOORA weighting requirement is met because the total weight is 1.00. The cost criteria consist of C1 and C6, while the benefit criteria consist of C2, C3, C4, C5, and C7.

4.4 Qualitative Data Conversion

Because the criteria C2 (processor performance) and C5 (warranty and after-sales service) are qualitative, they must be converted to a numerical scale of 1 to 5, as presented in Table 4.3 and Table 4. Other quantitative criteria can be used directly.

Table 4. Processor Performance Conversion Scale (C2)

Value	Prosesor Class
1	Celeron/Athlon class or equivalent
2	Kelas Pentium Gold atau setara
3	Core i3/Ryzen 3 class or equivalent

Value	Prosesor Class
4	Core i5/Ryzen 5 class or equivalent
5	Core i7/Ryzen 7 class or equivalent

Table 4. Warranty and after-sales service conversion scale (C5)

Value	Explanation
1	1-year warranty, no service partner in the Nias Islands
2	1-year warranty, there is a service partner in the Nias Islands
3	2-year warranty, no service partners in the Nias Islands
4	3-year warranty, there is a service partner in the Nias Islands
5	3-year warranty with on-site repair service in Medan

4.5 Specification Data and Decision Matrix

The specification data for each alternative based on the provider's offer is presented in Table 5.

Table 5. Alternative specification data

Alt.	C1 Price	C2 Prosesor	C3 RAM	C4 SSD	C5 Warranty/service	C6 Power	C7 TKDN
A1	Rp7.200.000	Core i3/Ryzen 3 Class	8 GB	SSD 256 GB	1-year warranty, local service partner	65 W	40%
A2	Rp8.500.000	Core i5/Ryzen 5 Class	8 GB	SSD 512 GB	2-year warranty, no local service	90 W	25%
A3	Rp9.800.000	Core i5/Ryzen 5 Class	16 GB	SSD 512 GB	3-year warranty, local service partner	120 W	40%
A4	Rp10.500.000	Core i7/Ryzen 7 Class	16 GB	SSD 512 GB	3-year warranty, on-site service	65 W	15%
A5	Rp6.900.000	Core i3/Ryzen 3 Class	8 GB	SSD 256 GB	1-year warranty, no local service	35 W	25%

Tables 4.3 and 4.4 are used to convert data from Table 5 into numerical values. To simplify, the prices are written in millions of rupiah. Because MOORA normalisation is ratio-based, this simplification does not affect the results. Therefore, the normalised value does not change when the unit scale is altered. Table 6 displays the decision matrix X.

Table 6 Decision Matrix (X)

Alt.	C1	C2	C3	C4	C5	C6	C7
A1	7,2	3	8	256	2	65	40
A2	8,5	4	8	512	3	90	25

Alt.	C1	C2	C3	C4	C5	C6	C7
A3	9,8	4	16	512	4	120	40
A4	10,5	5	16	512	5	65	15
A5	6,9	3	8	256	1	35	25

4.6 Normalisation of the Decision Matrix

Normalisation is carried out by dividing each alternative value by the square root of the sum of the squares of all alternative values on the same criterion. The first step is to calculate the divisor value for each criterion. For example, the divisor calculation for criterion C1 (price) is as follows.

$$\sqrt{(7{,}2^2 + 8{,}5^2 + 9{,}8^2 + 10{,}5^2 + 6{,}9^2)}$$
$$= \sqrt{(51{,}84 + 72{,}25 + 96{,}04 + 110{,}25 + 47{,}61)}$$
$$= \sqrt{377{,}99} = 19{,}4420$$

Table 7 Normalisation Divisor Values for Each Criterion

Criteria	Σx^2ij	$\sqrt{(\Sigma x^2ij)}$
C1	377,99	19,4420
C2	75,00	8,6603
C3	704,00	26,5330
C4	917504,00	957,8643
C5	55,00	7,4162
C6	32175,00	179,3739
C7	4675,00	68,3740

Next, each value in the decision matrix is divided by the criterion divisor value. Example calculation for alternative A1 is as follows.

$$x^*_{11} = 7{,}2 / 19{,}4420 = 0{,}3703$$
$$x^*_{12} = 3 / 8{,}6603 = 0{,}3464$$
$$x^*_{13} = 8 / 26{,}5330 = 0{,}3015$$
$$x^*_{14} = 256 / 957{,}8643 = 0{,}2673$$
$$x^*_{15} = 2 / 7{,}4162 = 0{,}2697$$
$$x^*_{16} = 65 / 179{,}3739 = 0{,}3624$$
$$x^*_{17} = 40 / 68{,}3740 = 0{,}5850$$

The same calculations were performed for alternatives A2 to A5. The complete results of the normalised matrix are presented in Table 8.

Table 8. Normalised Matrix (X*)

Alt.	C1	C2	C3	C4	C5	C6	C7
A1	0,3703	0,3464	0,3015	0,2673	0,2697	0,3624	0,5850
A2	0,4372	0,4619	0,3015	0,5345	0,4045	0,5017	0,3656
A3	0,5041	0,4619	0,6030	0,5345	0,5394	0,6690	0,5850
A4	0,5401	0,5774	0,6030	0,5345	0,6742	0,3624	0,2194
A5	0,3549	0,3464	0,3015	0,2673	0,1348	0,1951	0,3656

4.7 Weighted Normalised Matrix

The normalised value is then multiplied by the weight of each criterion (wj × x*ij). Example for A1 on criterion C1: 0.25 × 0.3703 = 0.0926. The complete results are presented in Table 9.

Table 9. Weighted Normalised Matrix

Alt.	C1 (C)	C2 (B)	C3 (B)	C4 (B)	C5 (B)	C6 (C)	C7 (B)
A1	0,0926	0,0693	0,0452	0,0267	0,0270	0,0362	0,0585
A2	0,1093	0,0924	0,0452	0,0535	0,0405	0,0502	0,0366
A3	0,1260	0,0924	0,0905	0,0535	0,0539	0,0669	0,0585
A4	0,1350	0,1155	0,0905	0,0535	0,0674	0,0362	0,0219
A5	0,0887	0,0693	0,0452	0,0267	0,0135	0,0195	0,0366

4.8 Weight Sensitivity Test

Sensitivity testing is conducted to determine the stability of the ranking results if the criteria weights change. This analysis is important because the weights are determined based on the school's assessment, which can vary among decision-makers. Four weight scenarios were tested as presented in Table 10.

Table 10. Sensitivity Test Weight Scenario

Scenario	C1	C2	C3	C4	C5	C6	C7	Σ
Scenario 1 (basic weight)	0,250	0,200	0,150	0,100	0,100	0,100	0,100	1,00
Scenario 2 (equal weight, 1/7)	0,143	0,143	0,143	0,143	0,143	0,143	0,143	1,00
Scenario 3 (cost emphasis)	0,350	0,150	0,100	0,050	0,100	0,150	0,100	1,00
Scenario 4 (performance emphasis)	0,150	0,300	0,200	0,100	0,100	0,050	0,100	1,00

Table 11. Optimisation Values and Rankings for Each Scenario

AlternatiVE	Scanario 1	Scanario 2	Scanario 3	Scanario 4
A1	0,0979 (4)	0,1482 (4)	-0,0030 (2)	0,2028 (4)
A2	0,1086 (3)	0,1613 (3)	-0,0251 (5)	0,2387 (3)
A3	0,1558 (2)	0,2215 (2)	-0,0080 (4)	0,3160 (2)
A4	0,1775 (1)	0,2437 (1)	0,0196 (1)	0,3375 (1)
A5	0,0830 (5)	0,1237 (5)	-0,0080 (3)	0,1780 (5)

The ranking order in each scenario is Scenario 1: A4 > A3 > A2 > A1 > A5; Scenario 2: A4 > A3 > A2 > A1 > A5; Scenario 3: A4 > A1 > A5 > A3 > A2; Scenario 4: A4 > A3 > A2 > A1 > A5. Alternative A4 consistently ranks first in all four scenarios, making the main recommendation stable against weight changes. Ranking changes only occur in the middle positions, indicating that these alternatives have relatively close optimisation values.

The calculation results show that the option with the lowest price is not always the best option. A5 has the lowest price (Rp6,900,000) and the lowest power consumption (35 W), but it has the lowest processor performance, storage capacity, warranty, and after-sales service.

Therefore, A4 has the highest price, but it has better processor performance, RAM, and on-site warranty and service, so the profit value (0.3487) can offset the cost (0.1713).

A4 and A3 also show the role of contextual criteria. Both options have the same amount of practical advantage value, which is 0.3487. This is because A3's advantage in the TKDN value and warranty and after-sales service is offset by A4's advantage in the processor. The difference in ranking is primarily determined by power consumption: A3 requires 120 W per unit, almost double that of A4 (65 W). This criterion has a significant impact on the number of units that can be operated simultaneously in the laboratory, with the school's electrical power being 2,200 watts.

Conclusion

From the analysis results, the MOORA method can be applied to the decision support system for selecting laboratory computers for procurement at SMK Negeri 2 Ulu Moro'o. This method involves five stages: determining alternatives and criteria, creating a decision matrix, ratio normalisation, optimisation value calculation, and ranking. There are seven criteria, consisting of five benefit criteria and two cost criteria. The calculation results show that A4 (PC All-in-One Type 4) is the best option with an optimisation value of 0.1775, followed by A3 (0.1558), A2 (0.1086), A1 (0.0979), and A5. MOORA has proven to be able to objectively balance price with performance, warranty, and other criteria. A5, the option with the lowest price, is ranked last. A4 remains in first place in the sensitivity test against four weight scenarios, indicating that the generated recommendations are stable and reliable.

Furthermore, this research shows that contextual factors such as warranty and after-sales service, electricity consumption, and the value of the domestic content ratio (TKDN) truly influence the decisions made by schools in the archipelago. The computers that must be chosen for school procurement differ from those chosen for individual customers due to the power consumption of A4 and A3, which even have the same practical value.

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