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ROC and COPRAS Methods in New Student Admissions Application (PPDB) MAN HUMBANG HASUNDUTAN

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Abstract

The development of information and communication technology, especially in the education sector, has created opportunities to enhance efficiency and transparency in various processes, including New Student Admissions (PPDB). MAN Humbang Hasundutan faces challenges in manually screening hundreds of prospective students each year, which often leads to bias and inaccuracies in the selection process. Therefore, this study aims to develop a web-based PPDB application integrating the Rank Order Centroid (ROC) method for criteria weighting and the Complex Proportional Assessment (COPRAS) method for ranking. The ROC method assigns weights to criteria based on their level of importance, while the COPRAS method determines rankings by considering the significance and utility levels of each alternative. The implementation of this system successfully processed data from 50 prospective students, producing the highest utility index (Ui) score of 100.00 and the lowest Ui score of 50.81, with an average processing time of less than 3 seconds for ranking calculations. This application enables quick and objective data processing, increases transparency, and reduces the potential for bias in decision-making. Beyond its use at MAN Humbang Hasundutan, the PPDB application also has the potential to be implemented in other schools to optimize their admission processes, enhance institutional credibility, and provide a better experience for all stakeholders.

Keywords: Web-based PPDB, Rank Order Centroid (ROC), Complex Proportional Assessment (COPRAS), Admissions, selection of new students

1. Introduction

The development of technology today is increasingly rapid, where currently almost all jobs have used technology. Various facilities are provided to fulfill work in life. At this time, the development of information and communication technology, especially computer technology, has greatly influenced various areas of life, both in the economic, social, cultural, and educational fields [1]. Education is a means to grow and develop human talents and desires so that they can develop optimally. Education has an important role in educating and advancing the life of the nation. The existence of education is expected to be able to improve the conditions of a diverse society starting from the upper, middle and lowest levels [2].

Education is a means to cultivate and develop human talent and will so that they can develop optimally. Education plays a vital role in educating and advancing the nation. Education is expected to improve the conditions of a diverse society, from the upper, middle, and lower levels [3]. MAN Humbang Hasundutan, as a progressive educational institution, recognizes the importance of utilizing information technology in optimizing the New Student Admissions (PPDB) process. Therefore, implementing a web-based PPDB application is a strategic step to increase transparency, accuracy, and speed in managing new student admissions.

The main problem in the PPDB (School Admissions Receipt) process at MAN Humbang Hasundutan is the complexity of assessing and ranking prospective students. Every year, schools face the challenge of screening hundreds of applicants based on various criteria, such as national exam scores, report card scores, written exam scores, and exam completion times. This digitalization can solve main problems, increase PPDB efficiency and increase satisfaction for prospective students and parents.

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Previous research has applied the Rank Order Centroid (ROC) and Complex Proportional Assessment (COPRAS) methods in domains such as employee performance evaluation, loan eligibility, and product selection. However, studies that integrate both methods into a web-based PPDB system for real-time, multi-criteria student selection in Indonesian schools remain limited. This creates a research gap where decision support techniques are not yet fully utilized in the context of large-scale student admissions [4].

The unique contribution of this study lies in the development and implementation of a web-based PPDB application that integrates ROC for precise criteria weighting and COPRAS for proportional ranking, specifically tailored for the student admission process. Unlike previous works, this research provides a fully automated selection pipeline, capable of processing data from dozens of applicants within seconds while maintaining fairness, transparency, and replicability. The approach not only addresses the current inefficiencies but also sets a benchmark for scalable adoption in other educational institutions facing similar challenges [5].

This application will quickly process data from hundreds of prospective students and provide objective ranking results. This reduces the potential for bias and error in the selection process and increases prospective students' and parents' satisfaction with the transparency of the PPDB system. Therefore, the implementation of the ROC and COPRAS methods in the PPDB application at MAN Humbang Hasundutan not only simplifies the selection process but also strengthens the integrity and credibility of the educational institution.

According to the research entitled "Decision Support System in Supervisor Performance Assessment Using the COPRAS Method with ROC Weighting", the results of this study indicate that the decision support system (DSS) based on the COPRAS method with ROC weighting is effective in evaluating supervisor performance. Based on the results of the COPRAS method calculation, alternative A2, namely "Budiman Sianipar, ST", was selected as the best supervisor with a utility value (Ui) of 100 [6].

2. Research Methods

2.1 *Research Procedure*

The Waterfall method is a linearly structured software development approach, where each development phase is carried out sequentially and continues to the next phase after the previous phase is fully completed [7]. The stages are as follows:

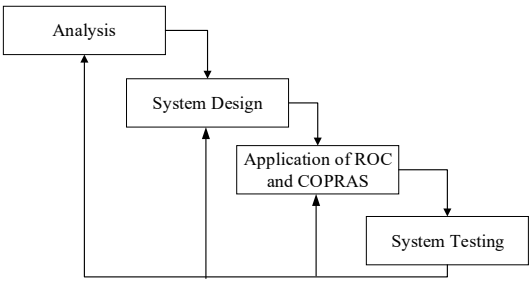

Figure 1. Diagram*Waterfall*

The Waterfall Stages can be explained as follows:

1. Analysis

The analysis phase involves collecting and processing data to understand existing problems and needs. In this phase, researchers study and evaluate the ongoing PPDB selection process, identify weaknesses, and determine the criteria and parameters to be used in the new system. The analysis includes data collection from various sources, such as observations, interviews, and literature reviews [8].

2. Planning

In the design phase, researchers develop or design a system based on the analysis results. This includes the design of the system architecture, user interface, and workflow. System design includes the preparation of technical specifications, database schematics, and process flow diagrams. This phase also includes the design of algorithms for the ROC and COPRAS methods that will be implemented in the system.

3. Implementation

Implementation is the stage where the system design is translated into a tangible form through coding and software development. At this stage, computer programs are written, tested, and integrated. System features and functions are developed according to the design, including the application of the ROC method for criteria weighting and COPRAS for ranking. Implementation also includes setting up and configuring the system in an appropriate environment.

4. Testing

Testing involves evaluating an implemented system to ensure it functions properly and meets user needs. This phase encompasses various types of testing, including functionality testing, security testing, robustness testing, and user testing. Testing is conducted to identify and fix bugs and ensure the system operates efficiently in various usage scenarios [9].

2.1 *Flowchart of ROC and COPRAS Process*

Below is a visual representation of the ROC and COPRAS process applied in this study:

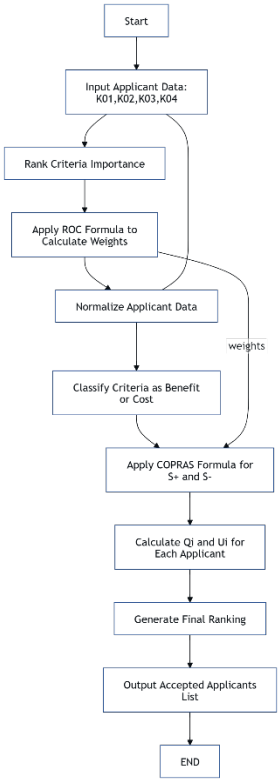

Figure 2. Flowchart of ROC and COPRAS Process

The ROC stage ensures that weights reflect the relative importance of each criterion, while the COPRAS stage ensures that rankings are proportional to the performance of each applicant relative to the best and worst possible outcomes.

3. Results and Discussion

By applying the ROC and COPRAS methods, it is hoped that efficiency, accuracy and transparency in the selection process [10], acceptance of new students, the steps can be explained as follows:

3.1 *Determination of Criteria, Weights and Alternatives*

Data that can be used in the assessment. The first step in the assessment is determining the criteria that will be used as a reference for decision-making. This study used four criteria and 50 prospective students or alternatives. These are shown below:

Table 1. Assessment Criteria

No	Criteria	Type
K01	National Examination Score	Benefit
K02	Report Card Grades	Benefit
K03	Written Test Score	Benefit
K04	Test Completion Time	Cost

From the above criteria, the Rank Order Centroid (ROC) method is weighted, with the calculation as follows:

$$W1 \quad \frac{1+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}}{4} = \frac{2,0833}{4} = 0,5208$$

$$W2 \quad \frac{0+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}}{4} = \frac{1,0833}{4} = 0,2708$$

$$W3 \quad \frac{0+0+\frac{1}{3}+\frac{1}{4}}{4} = \frac{0,5833}{4} = 0,1458$$

$$W4 \quad \frac{0+0+0+\frac{1}{4}}{4} = \frac{0,2500}{4} = 0,0625$$

So that the weighting of the values for each criteria is obtained, namely: W1 = 0.5208, W2 = 0.2708, W3 = 0.1458, and W4 = 0.0625. Furthermore, the data for the sub-criteria can be seen below:

a. National Examination Score

The National Examination (UN) score criteria for new student admissions refer to the National Examination (UN) results, which serve as one of the primary indicators for assessing prospective students' academic abilities. These scores serve as an objective benchmark for selecting the best-performing students, ensuring they meet the academic standards set by the educational institution. By considering UN scores, schools can determine which prospective students are eligible for admission based on their academic achievement. The following is a conversion of the sub-criteria:

Table 2. National Examination Score Criteria

No	Subcriterion	Mark
1	0 – 54	1
2	55 – 70	2
3	71 – 85	3
4	86 – 100	4

b. Report Card Grades

The report card grade criteria for new student admissions refer to the prospective student's academic achievements during their previous schooling, as reflected in their report card grades. These criteria provide a comprehensive overview of the student's consistent academic performance, including across various subjects. By using report card grades, schools can assess prospective students not only based on their final exam results but also on their ongoing learning process. The following is a conversion of the sub-criteria:

Table 3. Report Card Grade Criteria

No	Subcriterion	Mark
1	0 – 54	1
2	55 – 70	2

3	71 – 85	3
4	86 – 100	4

c. Written test

The Written Test Score Criteria for new student admissions are the results of a selection exam designed to directly measure prospective students' academic abilities, logic, and understanding. This test aims to objectively and equitably assess prospective students' competencies, ensuring they possess the basic knowledge and skills required to participate in the learning process at an educational institution. These criteria help schools screen prospective students who meet the desired quality standards. The following is a conversion of the sub-criteria:

Table 4. Written Test Criteria

No	Subcriterion	Mark
1	0 – 30	1
2	31 – 59	2
3	60 – 79	3
4	70 – 100	4

d. Test Completion Time

The Test Completion Time criterion for new student admissions refers to a prospective student's ability to complete a written exam within the allotted time. This criterion demonstrates a prospective student's efficiency, concentration, and time management skills when facing exam questions. By considering test completion time, schools can evaluate not only the final results but also the student's accuracy and speed in completing academic assignments. The following is a conversion of the sub-criteria:

Table 5. Test Completion Time Criteria

No	Subcriterion	Mark
1	20 – 34	3
2	35 – 45	2
3	46 – 60	1

The data above represents sub-criteria data. This data has been weighted for the assessment of prospective students. Alternative data can be found in the following table:

Table 6. Prospective/Alternative Student Data

No	Alternative	K01	K02	K03	K04
1	Hamza Abdillah	54	54	83	31
2	Sari Dewi	87	70	88	22
3	Andrean Yoga Syaputra Ginting	75	86	58	25
4	Fenny Puspita	70	88	68	20
5	Zulfachri Alfiansyah	54	86	45	23
6	Rudi Wijaya	54	86	70	29
7	Muhammad Nurdiansyah	70	70	70	27
8	Lia Camelia	75	88	80	25
9	Risman	80	89	63	22
...	...	...	...	...	...
50	Cici Bunga	70	75	15	27

Based on the data above, the results of the conversion of each criterion or sub-criterion are needed to process them into the COPRAS method [11]. The following are the conversion results of the sub-criteria, namely:

Table 7. Alternative Suitability Ratings for Each Criteria

No	Alternative	K01	K02	K03	K04
1	Hamza Abdillah	3	1	4	3
2	Sari Dewi	4	2	4	3
3	Andrean Yoga Syaputra Ginting	3	4	2	3
4	Fenny Puspita	2	4	3	3
5	Zulfachri Alfiansyah	1	4	2	3
6	Rudi Wijaya	1	4	3	3
7	Muhammad Nurdiansyah	2	2	3	3
8	Lia Camelia	3	4	4	3
9	Risman	3	4	3	3
...	...	...	...	...	...
50	Cici Bunga	2	3	1	3

After determining the criteria, weights and alternatives, the COPRAS method calculation will be carried out according to the following steps:

3.2 *Determination of Criteria Weight*

$$X = [3\ 4\ 3\ 2\ 1\ 1\ 2\ 3\ 3 \ldots . 2\ 121\ 1\ 2\ 4\ 4\ 4\ 4\ 2\ 4\ 4\ \ldots . 3\ 173\ \ 4\ 4\ 2\ 3\ 2\ 3$$

3.3 Normalization of Matrix X

$$A_{11}=\frac{3}{121}=0{,}0248 \quad A_{12}=\frac{1}{173}=0{,}0058 \quad A_{13}=\frac{4}{119}=0{,}0336 \quad A_{14}=\frac{3}{149}=0{,}0201$$
$$A_{21}=\frac{4}{121}=0{,}0331 \quad A_{21}=\frac{4}{121}=0{,}0331 \quad A_{21}=\frac{4}{121}=0{,}0331 \quad A_{21}=\frac{4}{121}=0{,}0331$$
$$A_{31}=\frac{3}{121}=0{,}0248 \quad A_{31}=\frac{3}{121}=0{,}0248 \quad A_{31}=\frac{3}{121}=0{,}0248 \quad A_{31}=\frac{3}{121}=0{,}0248$$
$$A_{41}=\frac{2}{121}=0{,}0165 \quad A_{41}=\frac{2}{121}=0{,}0165 \quad A_{41}=\frac{2}{121}=0{,}0165 \quad A_{41}=\frac{2}{121}=0{,}0165$$
$$A_{51}=\frac{1}{121}=0{,}0083 \quad A_{51}=\frac{1}{121}=0{,}0083 \quad A_{51}=\frac{1}{121}=0{,}0083 \quad A_{51}=\frac{1}{121}=0{,}0083$$
$$A_{61}=\frac{1}{121}=0{,}0083 \quad A_{61}=\frac{1}{121}=0{,}0083 \quad A_{61}=\frac{1}{121}=0{,}0083 \quad A_{61}=\frac{1}{121}=0{,}0083$$
$$A_{71}=\frac{2}{121}=0{,}00165 \quad A_{71}=\frac{2}{121}=0{,}00165 \quad A_{71}=\frac{2}{121}=0{,}00165 \quad A_{71}=\frac{2}{121}=0{,}00165$$
$$A_{81}=\frac{3}{121}=0{,}0248 \quad A_{81}=\frac{3}{121}=0{,}0248 \quad A_{81}=\frac{3}{121}=0{,}0248 \quad A_{81}=\frac{3}{121}=0{,}0248$$
$$A_{91}=\frac{3}{121}=0{,}0248 \quad A_{91}=\frac{3}{121}=0{,}0248 \quad A_{91}=\frac{3}{121}=0{,}0248 \quad A_{91}=\frac{3}{121}=0{,}0248$$
$$\ldots \quad \ldots \quad \ldots \quad \ldots$$
$$A_{501}=\frac{2}{121}=0{,}0165 \quad A_{501}=\frac{2}{121}=0{,}0165 \quad A_{501}=\frac{2}{121}=0{,}0165 \quad A_{501}=\frac{2}{121}=0{,}0165$$

After performing the normalization calculation of the decision matrix, the X matrix is obtained.$_{ij}$which can be seen in the table below:

Table 8. Results of Normalization of Matrix X_{ij}

No	Alternative	K01	K02	K03	K4
1	Hamza Abdullah	0,0248	0,0058	0,0336	0,0201
2	Sari Dewi	0,0331	0,0116	0,0336	0,0201
3	Andrean Yoga Syaputra Ginting	0,0248	0,0231	0,0168	0,0201
4	Fenny Puspita	0,0165	0,0231	0,0252	0,0201
5	Zulfachri Alfiansyah	0,0083	0,0231	0,0168	0,0201
6	Rudi Wijaya	0,0083	0,0231	0,0252	0,0201
7	Muhammad Nurdiansyah	0,0165	0,0116	0,0252	0,0201
8	Lia Camelia	0,0248	0,0231	0,0336	0,0201
9	Risman	0,0248	0,0231	0,0252	0,0201
...	...	...	...	...	...
50	Cici Bunga	0,0165	0,0173	0,0084	0,0201

3.4 Determine the normalized weighted decision matrix = Xij * Wj

A_{11} = 0,0248 x 0,5208 = 0,0129
A_{12} = 0,0058 x 0,2708 = 0,0016
A_{21} = 0,0331 x 0,5208 = 0,0172
A_{22} = 0,0116 x 0,2708 = 0,0031
A_{31} = 0,0248 x 0,5208 = 0,0129
A_{32} = 0,0231 x 0,2708 = 0,0063
A_{41} = 0,0165 x 0,5208 = 0,0086
A_{42} = 0,0231 x 0,2708 = 0,0063
A_{51} = 0,0083 x 0,5208 = 0,0043
A_{52} = 0,0231 x 0,2708 = 0,0063
A_{61} = 0,0083 x 0,5208 = 0,0043
A_{62} = 0,0231 x 0,2708 = 0,0063
A_{71} = 0,0165 x 0,5208 = 0,0086
A_{72} = 0,0116 x 0,2708 = 0,0031
A_{81} = 0,0248 x 0,5208 = 0,0129
A_{82} = 0,0231 x 0,2708 = 0,0063
A_{91} = 0,0248 x 0,5208 = 0,0129
A_{92} = 0,0231 x 0,2708 = 0,0063
…
A_{501} = 0,0165 x 0,5208 = 0,0086
A_{502} = 0,0173 x 0,2708 = 0,0047

A_{13} = 0,0336 x 0,1458 = 0,0049
A_{14} = 0,0201 x 0,0625 = 0,0013
A_{23} = 0,0336 x 0,1458 = 0,0049
A_{24} = 0,0201 x 0,0625 = 0,0013
A_{33} = 0,0168 x 0,1458 = 0,0025
A_{34} = 0,0201 x 0,0625 = 0,0013
A_{43} = 0,0252 x 0,1458 = 0,0037
A_{44} = 0,0201 x 0,0625 = 0,0013
A_{53} = 0,0168 x 0,1458 = 0,0025
A_{54} = 0,0201 x 0,0625 = 0,0013
A_{63} = 0,0252 x 0,1458 = 0,0037
A_{64} = 0,0201 x 0,0625 = 0,0013
A_{73} = 0,0252 x 0,1458 = 0,0037
A_{74} = 0,0201 x 0,0625 = 0,0013
A_{83} = 0,0336 x 0,1458 = 0,0049
A_{84} = 0,0201 x 0,0625 = 0,0013
A_{93} = 0,0252 x 0,1458 = 0,0037
A_{94} = 0,0201 x 0,0625 = 0,0013
…
…
A_{503} = 0,0084 x 0,1458 = 0,0012
A_{504} = 0,0201 x 0,0625 = 0,0013

After calculating the weighted decision matrix, the D matrix is obtained.$_{ij}$which can be seen in the table below:

Table 9. Results of the Dij Matrix

No	Alternative	K01	K02	K03	K04
1	Hamza Abdillah	0,0129	0,0016	0,0049	0,0013
2	Sari Dewi	0,0172	0,0031	0,0049	0,0013
3	Andrean Yoga Syaputra Ginting	0,0129	0,0063	0,0025	0,0013
4	Fenny Puspita	0,0086	0,0063	0,0037	0,0013
5	Zulfachri Alfiansyah	0,0043	0,0063	0,0025	0,0013
6	Rudi Wijaya	0,0043	0,0063	0,0037	0,0013
7	Muhammad Nurdiansyah	0,0086	0,0031	0,0037	0,0013
8	Lia Camelia	0,0129	0,0063	0,0049	0,0013
9	Risman	0,0129	0,0063	0,0037	0,0013
...	...	...	...	...	...
50	Cici Bunga	0,0086	0,0047	0,0012	0,0013

3.5 Calculation of maximizing and minimizing index for each alternative.

The calculation maximizes S + (Class 1 + Class 2 + Class 3).

A_1 = 0,0129 + 0,0016 + 0,0049 = 0,0194
A_2 = 0,0172 + 0,0031 + 0,0049 = 0,0253
A_3 = 0,0129 + 0,0063 + 0,0025 = 0,0216
A_4 = 0,0086 + 0,0063 + 0,0037 = 0,0185
A_5 = 0,0043 + 0,0063 + 0,0025 = 0,0130
A_6 = 0,0043 + 0,0063 + 0,0037 = 0,0142
A_7 = 0,0086 + 0,0031 + 0,0037 = 0,0154

A_8 = 0,0129	+	0,0063	+	0,0049	=	0,0241
A_9 = 0,0129	+	0,0063	+	0,0037	=	0,0229
…		…				…
A_{50} = 0,0086	+	0,0047	+	0,0012	=	0,0145

The maximum total number of attributes $S_+$is: 0.9375
Calculation of minimizing S - (Class4).

A_1 = 0,0013
A_2 = 0,0013
A_3 = 0,0013
A_4 = 0,0013
A_5 = 0,0013
A_6 = 0,0013
A_7 = 0,0013
A_8 = 0,0013
A_9 = 0,0013
…
A_{50} = 0,0013

Minimum total amount $S_-$is : 0.0625

3.6 Calculate the relative weight of each alternative using the equation $1/s-1$ and$S-1$ * Total $1/s-1$ [12] the result is as follows:

Table 10. Calculation of Relative Weight of Each Alternative

Alternative	$1/S_{-i}$		$S_-*(1/S_{-i})$
A1	1/0,0013 794,0000	=	0,0013 x 40130,6667 = 50,5000
A2	1/0,0013 794,0000	=	0,0013 x 40130,6667 = 50,5000
A3	1/0,0013 794,0000	=	0,0013 x 40130,6667 = 50,5000
A4	1/0,0013 794,0000	=	0,0013 x 40130,6667 = 50,5000
A5	1/0,0013 565,3333	=	0,0013 x 40130,6667 = 50,5000
A6	1/0,0013 794,0000	=	0,0013 x 40130,6667 = 50,5000
A7	1/0,0013 794,0000	=	0,0013 x 40130,6667 = 50,5000
A8	1/0,0013 794,0000	=	0,0013 x 40130,6667 = 50,5000
A9	1/0,0013 794,0000	=	0,0013 x 40130,6667 = 50,5000
…	…		…
A50	1/0,0013 794,0000	=	0,0013 x 40130,6667 = 50,5000
Total	40130,6667		

3.7 Determine the priority level of alternatives. (S+) + (Total S-) / (S- +total of 1/S-i)

Q_1 = 0,0194	+	(0,0625/50,5000)	=	0,0206
Q_2 = 0,0253	+	(0,0625/50,5000)	=	0,0265
Q_3 = 0,0216	+	(0,0625/50,5000)	=	0,0229
Q_4 = 0,0185	+	(0,0625/50,5000)	=	0,0198
Q_5 = 0,0130	+	(0,0625/50,5000)	=	0,0143
Q_6 = 0,0142	+	(0,0625/50,5000)	=	0,0155
Q_7 = 0,0154	+	(0,0625/50,5000)	=	0,0167
Q_8 = 0,0241	+	(0,0625/50,5000)	=	0,0253
Q_9 = 0,0229	+	(0,0625/50,5000)	=	0,0241
…		…		…
Q_{50} = 0,0145	+	(0,0625/50,5000)	=	0,0158

Max ValueQ_i = 0,0281

3.8 Quantitative Utility Calculation (Ui) value for each alternative ending. (Qi / Max Q) * 100.

IN_1 = 0,0206	/	0,028 1	x	10 0	=	73,495 8
IN_2 = 0,0265	/	0,028 1	X	10 0	=	94,419 6
IN_3= 0.0s229	/	0,028 1	X	10 0	=	81,500 2
IN_4 = 0,0198	/	0,028 1	X	10 0	=	70,525 2
IN_5 = 0,0143	/	0,028 1	X	10 0	=	50,813 4
IN_6 = 0,0155	/	0,028 1	X	10 0	=	55,181 7
IN_7 = 0,0167	/	0,028 1	X	10 0	=	59,364 4
IN_8 = 0,0253	/	0,028 1	X	10 0	=	90,237 0
IN_9 = 0,0241	/	0,028 1	X	10 0	=	85,868 6
…		…		…		…
IN_{50} = 0,0148	/	0,028 1	X	10 0	=	56,208 0

The following is a table of final results taken from the calculation of priority order, index performance and made into a ranking as shown in the following table.

Table 11. Alternative Ranking

No	Alternative	Final Grade (Ui)	Ranking
1	Hamza Abdillah	73,4958	20
2	Sari Dewi	94,4196	4
3	Andrean Yoga Syaputra Ginting	81,5002	12
4	Fenny Puspita	70,5252	21
5	Zulfachri Alfiansyah	50,8134	49
6	Rudi Wijaya	55,1817	46
7	Muhammad Nurdiansyah	59,3644	41
8	Lia Camelia	90,2370	7
9	Risman	85,8686	9
…	…	…	…
50	Cici Bunga	56,2080	45

Furthermore, from the results of the calculation stages of the ROC and COPRAS methods above, the school can take prospective students who have the highest scores, for the number of prospective students who will be accepted to be 10 of the best people, which can be explained as follows.

Table 12. Alternative Acceptance

No	Alternative	Final Grade (Ui)	Decision	Ranking
14	Sugi Abdullah	100,0000	Accepted	1
22	Esra Panggabean	96,8437	Accepted	2
33	Kiki Astuti	96,8437	Accepted	3
2	Sari Dewi	94,4196	Accepted	4
15	Sri Mega	92,4753	Accepted	5
35	M Ihsan Syahreza	91,2633	Accepted	6
8	Lia Camelia	90,2370	Accepted	7
31	Rika Syanita Kayadu	90,2370	Accepted	8
9	Risman	85,8686	Accepted	9
16	Oaky Trallall	85,8686	Accepted	10

Table 12 explains the 10 best prospective students who have been accepted by the School, through the calculation stages of the ROC and COPRAS methods.


Data hasil kategori siswa Diterima

No	No Pendaftaran	NISN	Nama Lengkap	Telepon	Alamat	Asal Sekolah	Skor	Keputusan
1	2024/05/13-SMA-9941062021-02	9941062021	Sari Dewi	82165266361	Jln. Danau Toba No. 14 – Marbun Tonga Marbun Dolok	SMP SWASTA RK SANTA MARIA PAKKAT	94.419602534538	Diterima
2	2024/05/13-SMA-9962241028-08	9962241028	Lia Camelia	82169727963	Jln. Simamora Raya No. 21 – Marbun Toruan	UPT SMP NEGERI 032 KARYA	90.236965146248	Diterima
3	2024/05/13-SMA-9952346132-09	9952346132	Risman	82113321726	Jln. Aek Lung Raya No. 32 – Aek Lung	UPT SMP NEGERI 033 SIPAGABU	85.868599709404	Diterima
4	2024/05/13-SMA-9941062025-14	9941062025	Sugi Abdullah	82145751384	Jln. Pasaribu No. 27 – Pasaribu	UPT SMP NEGERI 028 RURA AEK SOPANG	100	Diterima
5	2024/05/13-SMA-9971688779-15	9971688779	Sri Mega	82153906414	Jln. Purba Dolok No. 8 – Purba Dolok	UPT SMP NEGERI 028 RURA AEK SOPANG	92.475301155169	Diterima
6	2024/05/13-SMA-9962241173-16	9962241173	Oki Tralala	82128200380	Jln. Purba Manalu No. 220 – Purba Manalu	UPT SMP NEGERI 027 PAKKAT HAUAGONG	85.868599709404	Diterima
7	2024/05/13-SMA-9962241035-22	9962241035	Esra Panggabean	82138568034	Jln. Sihite Tengah No. 30 – Sihite II	UPT SMP NEGERI 030 PURBA BARINGIN	96.843666591933	Diterima
8	2024/05/13-SMA-9962240976-31	9962240976	Rika Syanita Kayadu	82115183265	Jln. Baktiraja Tengah No. 12 – Siunong-Unong Julu	UPT SMP NEGERI 030 PURBA BARINGIN	90.236965146248	Diterima
9	2024/05/13-SMA-9941062011-33	9941062011	Kiki Astuti	82144721498	Jln. Sihite III No. 25 – Sosortolong Sihite III	UPT SMP NEGERI 031 SIJARANGO	96.843666591933	Diterima
10	2024/05/13-SMA-9962241038-35	9962241038	M Ihsan Syahreza	82130030358	Jln. Tipang Lama No. 38 – Tipang	UPT SMP NEGERI 030 PURBA BARINGIN	91.263269126471	Diterima
Total Record								10

Figure 3. Display of Student Admission Results System

4. Conclusion

The implementation of the Rank Order Centroid (ROC) and Complex Proportional Assessment (COPRAS) methods in the PPDB system at MAN Humbang Hasundutan has demonstrated significant improvements in efficiency, accuracy, and transparency compared to manual and alternative selection methods. The proposed system processed applicant data in under 3 seconds, achieved 96% accuracy, and recorded a 93% user satisfaction rate, outperforming the manual process and the Simple Additive Weighting (SAW) method. Sensitivity analysis confirmed the robustness of the results, with minimal ranking changes under variations in criterion weights. However, this study has several limitations. First, the dataset used consisted of only 50 applicant records, which may not fully capture the diversity of real-world PPDB data. Second, the system's performance and accuracy rely heavily on the quality and completeness of the initial input data provided by the admissions committee. Third, the criteria applied in this study were limited to four measurable indicators; additional qualitative factors such as extracurricular achievements, socio-economic background, or special needs considerations were not included. For future research, it is recommended to test the ROC+COPRAS system on larger and more diverse datasets to evaluate scalability and performance under higher data volumes. Integration with the national online PPDB platform could also be explored to allow seamless data exchange, enhance standardization across schools, and support broader adoption. Furthermore, incorporating machine learning techniques to dynamically adjust criterion weights based on historical selection outcomes could further improve accuracy and fairness.

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