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Selection Of Internet Provider To Improve Quality Of Service And Learning Using Decision Support System

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ABSTRACT

During this pandemic, all kinds of activities are carried out online, including Education activities, learning is carried out online both at the elementary school to tertiary level, besides that the Minister of Education and Culture said that the priority for independent learning in 2021 would focus on eight priorities and one of them is digitalization that focuses on media public relations and media models. Digital education in this case the internet is one of the most important things to support these activities, if there is a disruption to the internet it will affect the learning process and academic services in an institution. Based on this policy, a decision-making policy is needed in determining the appropriate internet provider according to needs. The strong reason to look for in this research is the number of internet providers that offer fast, stable internet services and affordable prices, but in reality the network provided is not able to facilitate internet needs. A decision support system that is flexible and can provide answers quickly can help top management in making decisions. The results of the decision support system research using the Topsis algorithm method which is to provide ranking of the best alternatives and solutions. A decision support system that is flexible and can provide answers quickly can help top management in making decisions. The results of the decision support system research using the Topsis algorithm method which is to provide ranking of the best alternatives and solutions. A decision support system that is flexible and can provide answers quickly can help top management in making decisions. The results of the decision support system research using the Topsis algorithm method which is to provide ranking of the best alternatives and solutions.

1. Introduction

Minister of Education and Culture (Mendikbud) Nadiem Makarim said the priority for Merdeka Learning 2021 would focus on eight priorities, one of which is digitalization which focuses on public relations and media. The internet is needed not only to facilitate on-line learning using the ZOOM, Google Meet, Webex platforms, but is also needed in learning development such as access to LMS e-Learning, access to learning materials via YouTube, e-mail and Google, where lecturers and students can access all materials on-line anytime and anywhere without limitation of space and time. In addition, currently the internet has become a basic need to support administrative and academic services for education staff/employees due to the impact of the COVID-19 pandemic where in addition to learning,

The following is one of the facts that states the importance of the internet network, in addition to being a solution for needsvideo streaming, cloud computing, big data, IoT, gaming, the internet, can also bring about an increase in the economy. In addition, based on the TIPHON version which is a reference material as a standard in measuring quality of service (QOS) on the internet network, it says that every university is required to implement a truly reliable network or good Quality of Service, of course there are many things that need to be considered, both from in terms of Bandwidth, Delay, Packet Loss, Throughput and Jitter, because if any of these things do not meet the standards, the network performance will more or less experience disruption and will eventually lead to dissatisfaction of network users themselves.[1]

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Based on the above, a decision-making policy is needed in determining the internet provider that suits the needs of the campusThere are many internet providers that offer fast, stable, affordable internet services, but in reality the network provided is not able to facilitate campus internet needs, prices are expensive but the network is slow, customer service is not available, the local customer support team is not responsive and the provider does not provide configuration facilities. bandwidth (Bandwidth Management). The result is the disruption of campus information system services such as administrative and academic information systems, lecturer portals, student portals, financial systems, database systems and online learning e-Learning systems, email, YouTube learning and other information systems, while traffic access the entire information system and learning process above is very high per day. Eventually, Decision support systems are interactive information systems that provide information, model and manipulate data. a support system that is flexible, adaptable, and provides quick answers that can be controlled by the user[2]. This study uses 8 internet service providers as an alternative assessment, namely: PT Cyberindo Aditama (CBN), FirstMedia, Transvision, MNC Playmedia, PT Mora Telematika Indonesia (Oxygen), PT TelkomIndonesia, BizNet, and Indosat.

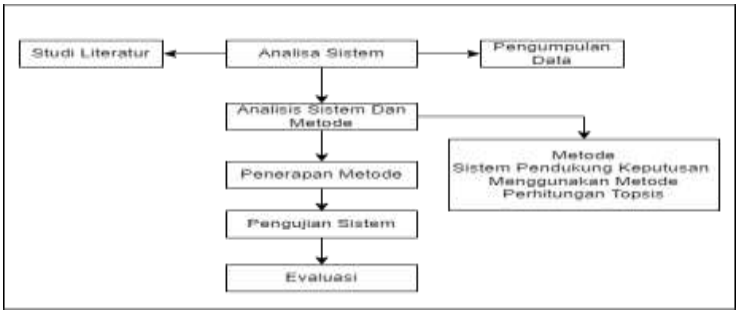
The results of the Decision Support System research using the algorithm methodTopsis (Technique for Orders Preference by Similarity to Ideal Solution) where the Topsis method is a criterion used to identify alternative set solutions based on minimizing the stimulus from the ideal point distance and maximizing the distance from the lowest point[3]. Topsis will rank alternatives based on the priority value of the relative proximity of an alternative to the positive ideal solution[4]. Topsis can combine the relative weights of important criteria, where data on all assessment criteria for alternatives (internet providers) will be calculated computerized using the TOPSIS method so as to produce the highest ranking to the lowest ranking. The ranking results will be an alternative decision that will be given to IAIN's top management to then make a decision on which internet provider to use for the IAIN campus according to needs, so that the decisions taken are unbiased and based on the facts of campus needs.

2. Method

The research methodology by describing the problem is equipped with the presentation of the flowchart of the research implementation to facilitate understanding the stages of the research. Research methodology is closely related to procedures, tools, and research designs used in conducting research. Therefore, a framework of thought is needed before starting the research.

2.1. Research Framework

The Research Framework is useful for making the stages that will be carried out in conducting research. Each stage is carried out as planned. Therefore, all stages in the research framework of this study affect the next stage.



Picture1. Research Framework

2.2. System analysis

System analysis is an important stage where the data that has been collected is transformed from writings either in the form of interviews or observation notes, into data containing the interpretation and understanding of the researcher as well as the relationship with the theory and substance of the research topic. The method used in this research is the Support System. Decision using Topsis Method.

2.3. System Diagram Blog

A blog system diagram is a diagram that depicts the functions performed by each component.

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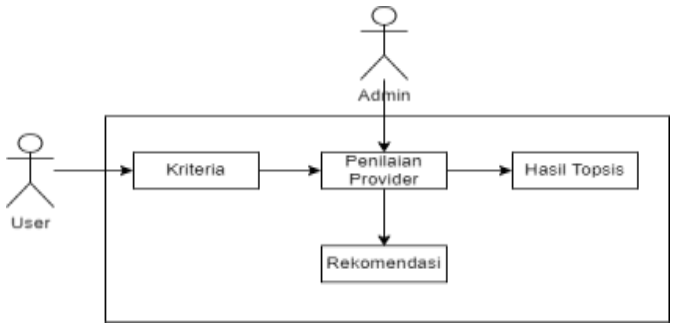
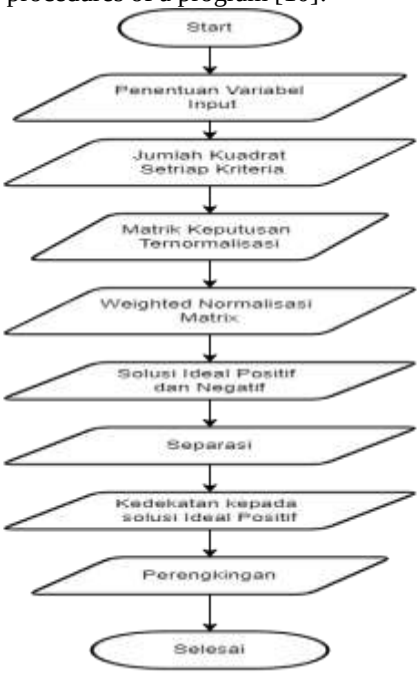


Picture2. System Diagram Blog

2.4. System Flowchart

Flowchart here describes the flow of a program process, Graphical depiction on a flowchart provides an overview of the steps and sequence of procedures of a program [10].



Picture 3.System Flowchart

3. Result and Discussion

In the implementation phase of this application, analysis of the needs of supporting devices is very important. This application can run well, if it meets the minimum standards of hardware (hardware) and supporting software (software) must also be available for the smooth implementation of the program. Topsis stages that will be carried out are as follows:

a. Determination of the table to be observed

TABLE 1
DETERMINATION OF THE TABLE TO BE OBSERVED

NO	Criteria	Information
1	C1	Network Quality
2	C2	Internet Service Coverage
3	C3	Price
4	C4	Benefit Cost

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b. Criteria and Weighting

The technique of weighting the criteria can be done in various ways and valid methods, this stage is known as pre-processing. Giving the bias weight value is done in a simple way, namely by assigning a value to each criterion directly based on the weight value. Pre-Processed Data Based on Questionnaire and Interview pengisian Network Quality, Internet Service Coverage, Price, Benefit cost.

TABLE 2
PRE-PROCESS QUESTIONNAIRE DATA

Alternative / Criteria	Network Quality	Service Coverage	Price	Benefit Cost
Biznet Network	10	10	20	40
FirstMedia	10	20	20	60
Transvision	20	10	40	20
MNC Playmedia	0	0	0	0
(Oxygen)	0	0	0	0
PT Telkom Indonesia	100	80	40	60
megavision	0	0	0	0
Indosat	60	80	40	60

TABLE 3
CRITERIA VALUE RANGE

Evaluation	Information	Criteria Value
80-100	very high	5
60-79	Tall	4
40-59	Enough	3
20-39	low	2
0-19	Very low	1

Determine the decision matrix : where 'i' is the criterion index (i=1 m...); m is the number of potential locations and 'j' is the alternative index (j=1... n). Elements C1, C2 ..., Cn refer to the criteria: while L1, L2 ..., Ln refer to alternative locations. The elements of the matrix related to the values of criterion 'i' with respect to alternative 'j' are as follows;

TABLE 4
DETERMINING THE DECISION MATRIX

cost / benefit	Benefits	benefits	Cost	Benefits
Weight	4	2	3	1
alternative / criteria	Network Quality	Service Coverage	Price	Benefit Cost
Biznet Network	1	1	2	3
FirstMedia	1	2	2	4
Transvision	2	1	3	2
MNC Playmedia	1	1	1	1
(Oxygen)	1	1	1	1
PT Telkom Indonesia	5	5	3	4
megavision	1	1	1	1
Indosat	4	5	3	4

1) Determine the normalized decision matrix: The equation used to transform each element is as follows;

$$NDM \quad = \quad R_{ij} = \frac{X_{ij}}{\sqrt{\sum_{i=1}^{m} X_{ij}^{2}}}$$

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TABLE 5
MULTICOLLINEARITIVITY TEST

Alternative	C1	C2	C3	C4
Biznet Network	0.377964473	0.377964473	0.471404521	0.547722558
FirstMedia	0.377964473	0.755928946	0.471404521	0.730296743
Transvision	0.755928946	0.377964473	0.707106781	0.365148372
MNC Playmedia	0.377964473	0.377964473	0.23570226	0.182574186
PT Mora Telematics Indonesia	0.377964473	0.377964473	0.23570226	0.182574186
PT Telkom Indonesia	1.889822365	1.889822365	0.707106781	0.730296743
PT Cemerlang Multimedia (Megavision)	0.377964473	0.377964473	0.23570226	0.182574186
Indosat	1.511857892	1.889822365	0.707106781	0.730296743

2) Create a weighted normalized decision matrix with the following formula;

$$V = V_{ij} = W_{ij} \times R_{ij}$$

TABLE 6
WEIGHTED NORMALIZATION MATRIX

Alternative	C1	C2	C3	C4
Biznet Network	0.565685425	0.260377822	0.973328527	0.375
FirstMedia	0.565685425	0.520755644	0.973328527	0.5
Transvision	1.13137085	0.260377822	1.45999279	0.25
MNC Playmedia	0.565685425	0.260377822	0.486664263	0.125
PT Mora Telematics Indonesia	0.565685425	0.260377822	0.486664263	0.125
PT Telkom Indonesia	2.828427125	1.30188911	1.45999279	0.5
PT Cemerlang Multimedia (Megavision)	0.565685425	0.260377822	0.486664263	0.125
Indosat	2.2627417	1.30188911	1.45999279	0.5

3) Identification of positive ideal solutions and negative ideal solutions with the formula used is as follows;

$$PIS = A^{+} = \{V_1^{+}, V_2^{+}, \ldots, V_n^{+}\}, where : V_j^{+} = \{(\max i(V_{ij}) if j \in J); (\min i(V_{ij}) if j \in J')\}$$

$$PIS = A^{-} = \{V_1^{-}, V_2^{-}, \ldots, V_n^{-}\}, where : V_j^{-} = \{(\min i(V_{ij}) if j \in J); (\max i(V_{ij}) if j \in J')\}$$

TABLE 7
IDENTIFY POSITIVE AND NEGATIVE IDEALS

A+	2.828427125	1.30188911	0.486664263	0.5
A-	0.565685425	0.260377822	1.45999279	0.125

4) Determining the positive ideal solution matrix and negative ideal solution with the formula used is as follows;

$$S^{-} = \sqrt{\sum_{i=1}^{n} (V_{ij} - V_i^{-})^2}$$

$$S^{-} = \sqrt{\sum_{i=1}^{n} (V_{ij} - V_i^{-})^2}$$

Where 'i'=index criteria, 'j'=alternative index.

TABLE 8
MATRIX OF POSITIVE AND NEGATIVE IDEAL SOLUTIONS

D+	D-
4.911473	0.547122
3.811446	0.667281
4.201317	0.579332
2.925766	0.973329
3.562407	0.973329
1.488199	2,519002
2,519002	0.973329
1.125775	2.026171

5) Calculating the relative closeness to the positive ideal solution:

$$C_i^+ = \frac{S_i^+}{(S_i^- + S_i^+)}, 0 \leq C_i^+ \leq 1$$

TABLE 9
PROXIMITY OF POSITIVE IDEAL SOLUTION

V	Results
0.100231	Biznet Network
0.148989	Firstmedia
0.12114	Transvision
0.249629	Mnc Playmedia
0.214591	Oxygen
0.628619	Telkom Indonesia
0.278705	Megavision
0.642832	Indosat

6) Ranking of Alternatives: Alternatives are sorted from the value of C+largest to smallest value. Alternative with C . value+ biggest is the best solution.

TABLE 10
ALTERNATIVE RANKING

V	Results	Rank
0.642832	Indosat	1
0.628619	Telkom Indonesia	2
0.278705	Megavision	3
0.249629	MNC Playmedia	4
0.214591	Oxygen	5
0.148989	FirstMedia	6
0.12114	Transvision	7
0.100231	Biznet Network	8

4. Conclusion

From the results of the study, it can be concluded that the application of a decision support system recommendation for the selection of Internet Providers to improve service quality and learning using a decision support system can be recommended based on the criteria and weights obtained that the recommended internet provider is the first account is Indosat Provider with a value of 0.642 and the smallest value is Biznet with 0.10023.

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