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The Best Public Health Center Selection Decision Support System Using Simple Additive Weighting (SAW) and Weighted Product (WP) Methods

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Abstract: Permenkes 43 of 2019 concerning Public Health Center (bahasa: Puskesmas) states that Puskesmas are Health Service Facilities (Faskes). Health center services in Indonesia are currently not fully in accordance with the regulations that have been made. In particular, the puskesmas in Pagelaran District, Pringsewu Regency, Lampung. Therefore, in this study, an assessment of the best health centers in Pagelaran District will be made. To realize the assessment of the best Puskesmas in Pagelaran sub-district, a research was carried out using a Decision Support System (DSS). In this case, the method used is the SAW and WP method, which is a method that uses weighted summation. In the process of collecting data using the literature study method, and taking several criteria and alternatives. With 5 criteria, namely medical equipment, location, facilities and infrastructure , medical personnel , and health services, while the alternatives taken were 5 health centers, namely UPT Puskesmas performances, Outpatient Health Center for Performances, Puskesmas Bumi Ratu, UPT Puskesmas Fajar Mulia, Puskesmas way Ngison. From the calculations carried out, the highest results or values are obtained, namely alternative 1 (A1) with a value of V1 = 94 for the SAW method and V1 = 0.22 for the WP method. Of the 5 alternatives tested with 4 criteria, the Puskesmas which is considered the best Puskesmas is A1 (UPT Puskesmas Pagelaran).

Keywords: Community Health Center, Decision Support System, SAW, WP.

1. INTRODUCTION

1.1 Background of the problem

Permenkes 43 of 2019 concerning Puskesmas states that Puskesmas are Health Service Facilities (Faskes). Health Service Facility is a place used to organize health service efforts, whether promotive, preventive, curative or rehabilitative carried out by the government, local

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government and/or the community. Puskesmas have the task of implementing health policies to achieve health development goals in their working areas [1] .
Based on research (M. Affandi Dwyan, 2020) the assessment of the best puskesmas still has problems, because the assessment is still subjective, the method used is ANP. The results of calculations using the ANP method obtained the highest calculation, namely 0.040 [2]. Based on the research conducted (Lendri et al., 2018), it is still not satisfactory, because it is not the application of methods or ways of counting using the AHP method, but only the system that is displayed in his research [3]. Based on research (Zaenal Hakim et al., (2020), the assessment of the best Puskesmas still has problems, because the assessment is still subjective and only uses one method, namely WP. The results of calculations using the WP method get the highest score of 0.2167 [4] .

The difference between the current research and the previous research is the process of data analysis using the SAW and WP methods and alternatives (objects of research) based on the criteria and weights obtained from technical sources of puskesmas assessment, and have different research results.
Health center services in Indonesia are currently not fully in accordance with the regulations that have been made. In particular, the puskesmas in Pagelaran District, Pringsewu Regency, Lampung. Why is that?, Because there are still employees who are negligent in carrying out their duties, such as arriving late, not good at serving the community, and also wandering around when their working hours are running.

Therefore, make a program to select the best health center using a decision support system (SPK). The method that will be used in this research is the Simple Additive Weighting (SAW) and Weighted Product (WP) methods. Which is a method or method of calculating the weighted addition.

1.2 Formulation of the problem

From the statement above, there are several problems, including;

1. How to determine the best puskesmas in Pagelaran District
2. How to determine the method of Simple Additive Weighting (SAW) and Weighted Product (WP) in this study.

1.3 Research Objectives and Benefits

a. Purpose
   The purpose of this research is to build a decision support system Determination of the best puskesmas in the city of Pagelaran using the Simple Additive Weighting (SAW) and Weigthted Product (WP) methods .

b. Research Benefits

   1. For researchers

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With this research, it is hoped that add insight and knowledge about Future research will be more careful in conducting further research.

2. For Consumers
With this research, it is hoped that can make consumers can choose the best health center in the city of Pagelaran.

2. LITERATURE REVIEW

2.1 Previous Research

No	Title and Author	Problem	Method	Results
1	Decision Support System for Choosing the Best Health Center in Tanjung Balai City Using the Analytical Network Process Method, M. Affandi Dwyan, (2020).	Finding the health center with the best performance using the ANP method.	ANP	Tualang Raso Health Center with a value of 0.040.
2	Health Center Accreditation Eligibility Decision Support System Using the Analytic Hierarchy Process (Ahp) Method at the Sangihe District Health Office, Lendri A Garing, Stenly C. Takarendehang, Abraham Kamal, (2018).	Not objective in providing Puskesmas accreditation and not on target.	AHP	Produce a system that can assist the Head of the Health Office in determining the right, fast and relevant accredited puskesmas.
3	Decision Support System for Choosing the Best Health Personnel Using the Weight Product Method, Zaenal Hakim, Asep Hardianto Nugroho, Moh Ridwan, Sukisno, (2020).	The selection of the best midwives and puskesmas is still manual.	WP	Highest value 0.2167
4	Application of Efficiency Measurement of Community Health Centers (Puskesmas) Using the Data Envelopment Analysis (Dea) Method With Output Oriented Bcc Modeling, Aisyah Jehan Ahmad (2018).	How to design and build applications that can measure the efficiency value between health centers.	Data Envelopment Analysis (DEA)	Produce an application that can be a decision support application to measure the efficiency value between health centers.

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5	Analysis of Human Resources (HR) Planning for Health Centers Using the Workload Indicators Of Staffing Needs (Wisn) Method in West Lombok Regency.	Analyzing HRD planning	*Workload Indicators of Staffing Needs* (WISN)	8 work units and 8 power categories, have a high workload (WISN ratio<1)

2.2 Decision Support System Concept

According to Alatifkhu, Satria (2019), Decision Support System (DSS) is an interactive information system that provides information, modeling, and manipulating data. This system is used to assist decision making in various situations, such as semi-structured and unstructured, where no one knows for sure how decisions should be made. This system is usually built to help support solutions to problems or to evaluate opportunities [7] .

2.3 Purpose of Decision Support System

The objectives of the decision support system are as follows:

1. Assist managers in making decisions on semi-structured problems
2. Provides support at the manager's discretion and is not intended to replace the manager's function
3. Increasing the effectiveness of managers' decisions more than improving their efficiency
4. Computing speed.
5. Increased productivity [7].

2.4 Decision Making Process

The decision-making process is divided into three phases:

1. Intelligence, namely the process of tracing and detecting the scope of the problem and the process of recognizing the problem. Input data is obtained, processed, and tested in order to identify problems.
2. Design, which is the process of finding, developing, and analyzing alternative actions that can be taken, including the process of understanding the problem, deriving solutions, and testing the feasibility of the solution.
3. Choice, which is the process of selecting among various alternative actions that may be carried out and then implemented in the decision-making process [7] .

2.5 Public health center

According to M. affandi Dwyan (2020), Community Health Centers (Puskesmas) are functional organizations that carry out health efforts that are comprehensive, integrated,

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equitable, acceptable, and easily accessible to the community, with community participation [2] .

According to Chayatin (2009), the health care system is very important to improve health status. With the existence of a health service system, the goal of improving health status can be achieved effectively, efficiently and directed. This health care system can be built on existing components including funding for supporting facilities and existing human resources such as doctors , nurses, nutritionists, nursing, and other health groups [3] .
According to Azrul Azwar (1996), the definition of Puskesmas is a functional unit that functions as a center for health development, a center for increasing community participation in the health sector and a primary service center that carries out its activities holistically in an inclusive and sustainable manner in communities living in certain areas.

2.6 Performance city
According to Wikipedia, Pagelaran is one of the cities located in Pagelaran District, Pringsewu Regency. A small town with a population of 46,330 people (BPS Pringsewu Regency 2016).The show is very famous for its freshwater fishery products, so it has become a freshwater fish center area in Pringsewu Regency, Lampung, Indonesia. This sub-district is located on the West Sumatran route, located approximately 12 km from the navel of the capital city of Pringsewu. The inhabitants of this area are Javanese, Lampung, Batak, Padang, Banten, Balinese, Komering, Palembang [8] .

2.7 FMADM
According toTaufik Hidayat, Fajar Widiyanto, Yulia karlina hasyim (2017), Fuzzy Multi-Attriute Decision Making (FMADM) is a method used to find the optimal solution among several alternatives with certain criteria. The essence of FMADM is to determine the oot value for each attribute and then perform a ranking process to select the proposed solution. Basically, there are 3 approaches to find the value of oot attriut, namely subjective approach, objective approach and integrated approach between subjective and objective. Each approach has advantages and disadvantages. In the subjective approach, the weighting value is determined based on the subjectivity of the decision maker so that several factors in the alternative ranking process can be determined independently. Meanwhile, according to the objective approach, the weighting value is calculated mathematically so that it ignores the subjectivity of the decision maker. There are several methods that can be used to troubleshoot FMADM problems among others:

a. Simple additive weighting method (PBUH);
b. Product closely (WP);
c. Year;
d. Deletion and selection of translations the real one (ELECTER);
e. Similar to Ideal Solution Priority Technique (TOPSIS);
f. Analytical Hierarchy Process (AHP) [9] .

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3. RESEARCH METHOD

3.1 Data collection

The research data collection methods used in this study are :

a. Observation
   Using the observation method, researchers went directly to the puskesmas in Pagelaran District and observed and interacted manually so that the research could better understand the problems that would be used as research material.

b. Interview
   Using this technique, the researcher applies questions and answers to people in the Puskesmas such as nurses, visitors, patients, doctors and other staff, to be interviewed about the management that has been carried out so far so that researchers can find shortcuts for the best Puskesmas assessment.

c. Literature
   Look for reference sources that are obtained indirectly, or according to data that is already available, such as in books, insights, and the internet related to the object being worked on.

3.2 Design Model

3.2.1 Fishboon Chart

Fishbone diagram or fishbone diagram is a way to analyze the root cause of a problem or condition. This diagram is often referred to as a cause-and-effect diagram. Its inventor in 1943 was Professor Kaoru Ishikawa, a Japanese scientist who graduated from the University of Tokyo in chemical engineering. Therefore, it is often called an Ishikawa diagram [12].

The basic function of a fishbone / cause and effect / Ishikawa diagram is to identify and organize the possible causes of a particular effect and isolate the root cause. Fishbone diagram itself is often used to identify the root cause of a problem and generate solutions to the problem [12].

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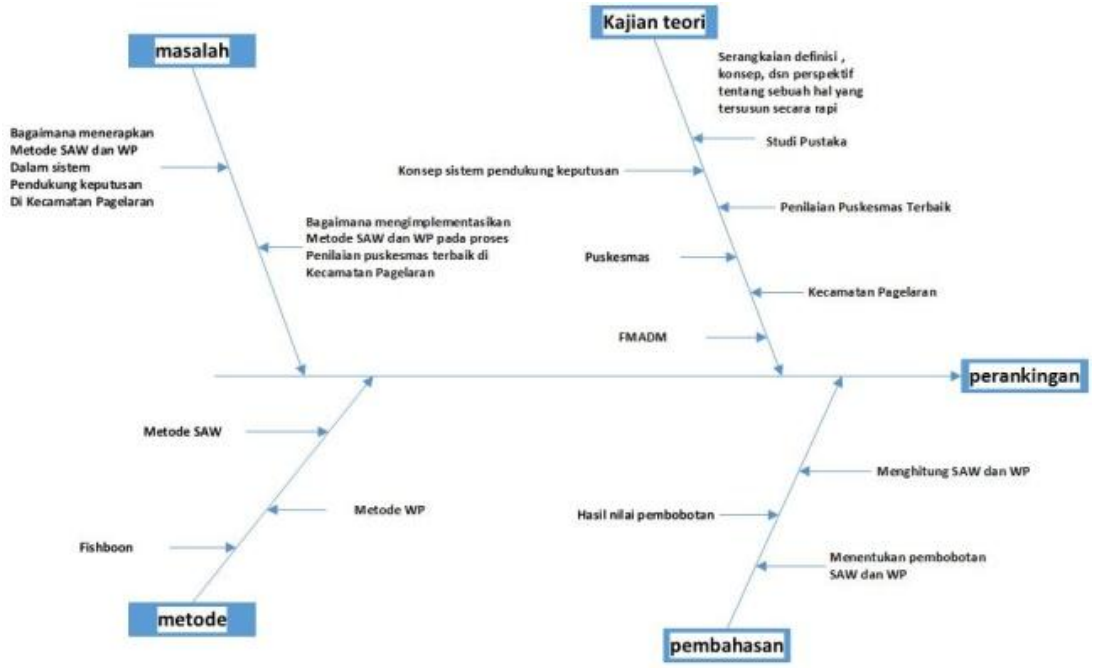

Figure 1. Fishboon method

The figure above illustrates how each process of measuring the performance of the Puskesmas is. Here's an explanation of the image above.

a. Phase one describes the results of the ranking of all Puskesmas performance measurement lines
b. Phase two describes the problems that exist in measuring the performance of the Puskesmas in Pagelaran District, Pringsewu. How to apply the SAW and WP methods in a health center assessment decision support system.
c. The third stage describes the method used in calculating and ranking the performance of Puskesmas using the SAW, WP, and Fishboon methods, where this is looking for existing performance weights.
d. Stage four explains the theoretical study which explains the concept of SPK, performance appraisal of Puskesmas, as well as the SAW and WP methods where the theory is taken from references on the internet.
e. Stage five describes the discussion that contains the results of observations on the research object from the data obtained and explains the solution to the problem to be solved. This discussion contains the calculation of the SAW and WP methods, determining weighting, and calculating the ranking results from the performance measurement of the Puskesmas.

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3.2.2 SAW method

According to Taufik, Fajar, Yulia (2017), the *Simple Additive Weighting (SAW) method*, one of the calculation methods , is more exactly the weighted sum. The basic concept of This method basically is look for the weighted sum obtained from the rating performance on each alternative across all attributes. SAW can be a reference for other methods in terms of support decision, because this method uses weighted sum, I mean look for weighted summation on each alternative in all attribute.

The SAW method requires a normalization process decision matrix (X) to a scale that can be compared with all alternative ratings that there is. (Sri Kusumadewi, 2006: 74).

$$\boldsymbol{r_{ij}} = \begin{cases} \dfrac{Xij}{Max\ (Xij)} \\ \dfrac{Min\ (Xij)}{Xij} \end{cases}$$

Description :

MaxX_{ij} = value of each row and column

MinX_{ij} = minimum value of each row and column

Benefit = if the largest value isbest
s

Cost = if the smallest value is the best

If $j$the profit attribute (benefit)

If $j$the cost attribute(cost)

Where is rij as the normalized performance rating of alternative Ai on attributeCj ; $i = 1,2, \dots, m$and $j = 1,2, \dots, n$. Preference value for each alternative (Vi)

$$\boldsymbol{V_i} = \sum_{j=1}^{n} w_j r_{ij}$$

Information :

Vi= rank for each alternative

wj= weight value of each criterion

rij=normalized performance rating nilai

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ScoreViwhichmorelarge indicates that the alternative $Ai$is moreselected [9] .

3.2.3 WP method

According to Deny, Evi, Ade (2018), the W *eigthted Product (WP) Method*is the methodsolutionusing multiplication to relate attribute ratings, where the rating must be raised to the first power with the weight of the attribute in question.

The following are the steps in the *weighted product method* :

1. Initial weighting on eachcriteria.
2. Determining valuable criteriaprofits and costs. If it is profitable then the attribute value is positive and if it is cost value then the attribute value isnegative.
3. Improvement of the weight of the initial weight value usingformula:

$$\boldsymbol{Wj} = \frac{W}{\sum w} \qquad (1)$$

4. Determining the value of the vector (S) usingformula:

$$\boldsymbol{S_i} = \prod_{i=1}^{n} {X_{ij}}^{Wj} (2)$$

Information:

S = Alternative preferences are analogous tovector S
X = Criteria Value
w = Criteria weight orsub-criteria
i = Alternative (where$i = 1,2,\ldots n$)
j = Criteria
n = Number of criteria

Meanwhile $\sum wj = 1$, the rank is positive for the profit attribute, and negative for the cost attribute.

5. Specifies the value of the vector (V).

$$V_i = \frac{\prod_{j=1}^{n} \boldsymbol{X_{ij}}^{\boldsymbol{wj}}}{\prod_{j=1}^{n} (X_j^*)} \qquad (3)$$

Information:

V = Alternative preferences are analogous tovector V
X = Criteria Value
w = Criteria weight orsub-criteria

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i = Alternative (where$i = 1,2,\ldots n$)
j Criteria
n = Number of criteria
$*$ = The number of criteria that have been assessed onvector S [11]

3.2.4 Determination of Criteria and Weights

The criteria used refer to the rules Puskesmas assessment which can be seen in table 1:

Table 1. Criteria for Puskesmas

Criteria	Information
C1	Medical Equipment
C2	Location
C3	Facilities and infrastructure
C4	Medical personnel
C5	Health services

From each of these criteria will be determined each weight. It will be clearer the weights are made in table 2:

Table 2. Weighting

Information	Weight
Very Less	1
Not enough	2
Enough	3
Well	4
Very good	5

3.2.5 Weighting of Each Criteria

From these criteria, a level is made the importance of the criteria based on the weight value of the sub-criteria that has been specified in tables 3, 4, 5, 6 and 7, as follows :

Table 3. Sub Criteria for Medical Equipment

No	Information	Weight
1	If all points are met	5
2	If only 4 points are met	4
3	If only 3 points are met	3
4	If only 2 points are met	2

a. Light operation equipment
b. Pathological obstetric equipment, vasectomy and tubectomy.
c. resuscitation equipment.
d. Minimum of 10 beds with grooming equipment.

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e. Communication and transportation tools.
f. One ambulance (minimum).

Table 4. Sub-Criteria Location

No	Information	Weight
1	± 20 km from hospital	5
2	>50 km from hospital	4
3	>75 km from hospital	3

Table 5. Sub Criteria for Facilities and Infrastructure

No	Information	Weight
1	If all points are met	5
2	If only 3 points are met	4
3	If only 2 points are met	3
4	If only 1 point is met	2

a. Adequate inpatient room (comfortable, spacious, and separate for children, women and men to maintain privacy)
b. Operating room and post surgery room.
c. Delivery room (there is a breastfeeding room as well as a recovery room).
d. Nurse's room.
e. Room linen and laundry.

Table 6. Sub Criteria for Medical Personnel

No	Information	Weight
1	If all points are met	5
2	If only 3 points are met	4
3	If only 2 points are met	3
4	If only 1 point is met	2

a. The second doctor at the Puskesmas who has received clinical training in the Hospital for 6 months in the field of surgery.
b. A nurse who has been trained for 6 months in the fields of surgical care, obstetrics, pediatrics, and internal medicine.
c. 3 nurses/midwives assigned rotating duties.
d. 1 health worker (high school or more).

Table 7. Sub Criteria for Health Services

No	Information	Weight
1	If all points are met	5
2	If only 4 points are met	4
3	If only 3 points are met	3
4	If only 2 points are met	2

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Determining the quality of a service can be viewed from five dimensions in determining service quality, namely:

a. Reliability (skill/reliability)
b. Responsiveness (responsiveness)
c. Assurance (guarantee)
d. Empathy (Empathy)
e. Tangibles (Live Evidence)

3.2.6 Application of Fuzzy Attribute Decision Making (FDAM)

SAW and WP methodFrom the number of health centers, taken 5 Health center as an example the application of the SAW and WP methods in the assessment of the Puskesmas.

Table 7. Health Center Assessment

Alternative	**Criteria**				
	C1	**C2**	**C3**	**C4**	**C5**
UPT Health Center Pagelaran	5	4	4	4	5
Pagelaran Outpatient Health Center	5	3	3	4	5
Bumi Ratu Health Center	5	5	3	3	4
UPT Fajar Mulia Health Center	4	4	4	3	4
Way ngison health center	4	4	3	5	4

Table 8. The suitability rating of each alternative on criteria

Alternative	**Criteria**				
	C1	**C2**	**C3**	**C4**	**C5**
A1	5	4	4	4	5
A2	5	3	3	4	5
A3	5	5	3	3	4
A4	4	4	4	3	4
A5	4	4	3	5	4

And referring to table 8, we get matrix decision X with the following data:

$$X = \begin{pmatrix} 5 & 4 & 4 & 4 & 5 \\ 5 & 3 & 3 & 4 & 5 \\ 5 & 5 & 3 & 3 & 4 \\ 4 & 3 & 4 & 3 & 4 \\ 4 & 4 & 3 & 5 & 4 \end{pmatrix}$$

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3.2.7 iving the weight value W

Decision making gives weight, based onthe level of importance of the criteria for each criterionneeded

$$W = (40\ 20\ 20\ 10\ 10)$$

Normalize matrix X to matrix R

Table 9. Classification of criteria

	Criteria	Cost	Benefits
C1	Medical Equipment	-	✓
C2	Location	-	✓
C3	Facilities and infrastructure	-	✓
C4	Medical Personnel	-	✓
C5	Health services	-	✓

4. DISCUSSION

4.1 Counting

4.1.1 SAW method

A. Normalize matrix (x) for each criterion based on the following equation;

$$r_{ij} = \begin{cases} \dfrac{Xij}{Max\ (Xij)} \\ \dfrac{Min\ (Xij)}{Xij} \end{cases}$$

C1

$r11 = \frac{5}{\max(5\ 5\ 5\ 4\ 4)} = \frac{5}{5} = 1$

$r21 = \frac{5}{\max(5\ 5\ 5\ 4\ 4)} = \frac{5}{5} = 1$

$r31 = \frac{5}{\max(5\ 5\ 5\ 4\ 4)} = \frac{5}{5} = 1$

$r41 = \frac{4}{\max(5\ 5\ 5\ 4\ 4)} = \frac{4}{5} = 0.8$

$r51 = \frac{4}{\max(5\ 5\ 5\ 4\ 4)} = \frac{4}{5} = 0.8$

C2

$r12 = \frac{4}{\max(4\ 3\ 5\ 3\ 4)} = \frac{4}{5} = 0.8$

$r22 = \frac{3}{\max(4\ 3\ 5\ 3\ 4)} = \frac{3}{5} = 0.6$

$r32 = \frac{5}{\max(4\ 3\ 5\ 3\ 4)} = \frac{5}{5} = 1$

$r42 = \frac{3}{\max(4\ 3\ 5\ 3\ 4)} = \frac{3}{5} = 0.6$

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r52 = $\frac{4}{\max(4\ 3\ 5\ 3\ 4)} = \frac{4}{5} = 0.8$

C3

r13 = $\frac{4}{\max(4\ 3\ 3\ 4\ 3)} = \frac{4}{4} = 1$

r23 = $\frac{3}{\max(4\ 3\ 3\ 4\ 3)} = \frac{3}{4} = 0.75$

r33 = $\frac{3}{\max(4\ 3\ 3\ 4\ 3)} = \frac{3}{4} = 0.75$

r43 = $\frac{4}{\max(4\ 3\ 3\ 4\ 3)} = \frac{4}{4} = 1$

r53 = $\frac{3}{\max(4\ 3\ 3\ 4\ 3)} = \frac{3}{4} = 0.75$

C4

r14 = $\frac{4}{\max(4\ 4\ 3\ 3\ 5)} = \frac{4}{5} = 0.8$

r24 = $\frac{4}{\max(4\ 4\ 3\ 3\ 5)} = \frac{4}{5} = 0.8$

r34 = $\frac{3}{\max(4\ 4\ 3\ 3\ 5)} = \frac{3}{5} = 0.6$

r44 = $\frac{3}{\max(4\ 4\ 3\ 3\ 5)} = \frac{3}{5} = 0.6$

r54 = $\frac{5}{\max(4\ 4\ 3\ 3\ 5)} = \frac{5}{5} = 1$

C5

r15 = $\frac{5}{\max(5\ 5\ 4\ 4\ 4)} = \frac{5}{5} = 1$

r25 = $\frac{5}{\max(5\ 5\ 4\ 4\ 4)} = \frac{5}{5} = 1$

r35 = $\frac{4}{\max(5\ 5\ 4\ 4\ 4)} = \frac{4}{5} = 0.8$

r45 = $\frac{4}{\max(5\ 5\ 4\ 4\ 4)} = \frac{4}{5} = 0.8$

r55 = $\frac{4}{\max(5\ 5\ 4\ 4\ 4)} = \frac{4}{5} = 0.8$

$$Matrik\ R = \begin{pmatrix} 1 & 0.8 & 1 & 0.8 & 1 \\ 1 & 0.6 & 0.75 & 0.8 & 1 \\ 1 & 1 & 0.75 & 0.6 & 0.8 \\ 0.8 & 0.6 & 1 & 0.6 & 0.8 \\ 0.8 & 0.8 & 0.75 & 1 & 0.8 \end{pmatrix}$$

B. Furthermore, the ranking process is based on the following equation;

$$\square_{\square} = \sum_{\square=1}^{\square} \square_{\square} \square_{\square\square}$$

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V1 = (1x40)+(0.8x20)+(1x20)+(0.8x10)+(1x10)
= 40 + 16 +20 + 8 + 10
= 94

V2 = (1x40)+(0.6x20)+(0.75x20)+(0.8x10)+(1x10)
= 4 0 + 12 + 15 + 8 + 10
= 85

V3 = (1x40)+(1x20)+(0.75x20)+(0.6x10)+(0.8x10)
= 4 0 + 20 + 15 + 6 + 8
= 89

V4 = (0.8x40)+(0.6x20)+(1x20)+(0.6x10)+(0.8x10)
= 32 + 12 + 20 + 6 + 8
= 78

V5 = (0.8x40)+(0.8x20)+(0.75x20)+(1 x10)+(0.8x10)
= 32 + 16 + 15 + 10 + 8
= 81

4.1.2 WP method

A. Fix the total weight with the following equation :

$$\boldsymbol{Wj} = \frac{W}{\sum w}$$

W1 = $\frac{40}{40+20+20+10+} = \frac{40}{100} = 0.4 * 1 = 0.4$

W2 = $\frac{20}{40+20+20+10+10} = \frac{20}{100} = 0.2 * 1 = 0.2$

W3 = $\frac{20}{40+20+20+10+10} = \frac{20}{100} = 0.2 * 1 = 0.2$

W4 = $\frac{10}{40+20+20+10+10} = \frac{10}{100} = 0.1 * 1 = 0.1$

W5 = $\frac{10}{40+20+20+10+10} = \frac{10}{100} = 0.1 * 1 = 0.1$

B. Then the vector S is calculated based on the equation :

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$$S_i = \prod_{i=1}^{n} X_{ij}^{Wj}$$

S1 = $(5^{0.4})$ $(4^{0.2})$ $(4^{0.2})$ $(4^{0.1})$ $(5^{0.1})$ = 4.47

S2 = $(5^{0.4})(3^{0.2})(3^{0.2})(4^{0.1})$ $(5^{0.1})$ = 3.98

S3 = $(5^{0.4})$ $(5^{0.2})(3^{0.2})$ $(3^{0.1})(4^{0.1})$ = 4.19

S4 = $(4^{0.4})(3^{0.2})(4^{0.2})(3^{0.1})(4^{0.1})$ = 3.66

S5 = $(4^{0.4})(4^{0.2})(3^{0.2})(5^{0.1})$ $(4^{0.1})$ = 3.86

4.47 + 3.98 + 4.19 + 3.66 + 3.86 = 19.83

C. determine the ranking using the equation :

$$V_i = \frac{\prod_{j=1}^{n} X_{ij}^{Wj}}{\prod_{j=1}^{n} (\square_{\square}{}^{*})}$$

V1 = $\frac{4.47}{19.83} = 0.22$

V2 = $\frac{3.68}{19.83} = 0.18$

V3 = $\frac{4.19}{19.83} = 0.21$

V4 = $\frac{3.63}{19.83} = 0.18$

V5 = $\frac{3.86}{19.83} = 0.19$

Table 10. Calculation results and ranking using two methods

Alternative	SAW	Rank	WP	Rank
A1	94	1	1.22	1
A2	85	3	0.18	4
A3	91	2	0.21	2

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A4	78	5	0.18	5
A5	81	4	0.19	3

By using the SAW method, the ranking results are obtained:$V1 = 94$; $V2 = 85$; $V3 = 91$; $V4 = 89$; $V5 = 81$. The greatest value is in V1 and V3. Therefore selected alternative as the best alternative. Meanwhile, by using the WP method, the ranking results are obtained: $V1 = 0.22$; $V2 = 0.18$; $V3 = 0.21$; $V4 = 0.18$; $V5 = 0.19$. The largest values are in $V1$and $V3$. Therefore selected alternative as the best alternative.

4.1.3 Results Analysis

From the data that has been calculated and implemented using the SAW and WP methods, it can be seen the difference in the results obtained from the two methods. Alternatives 1 and 3 in both methods have the same ranking, but alternatives 2, 4 and 5 in both methods have different rankings.

5. CONCLUSION

From the results of testing the system developed using the *Simple Additive Weighting* (SAW) method and *weighted product (WP)*it can be concluded that the decision support system to determine the best puskesmas is $V1 = 94$; $V2 = 85$; $V3 = 91$; $V4 = 78$; $V5 = 81$ for the SAW method, while $V1 = 0.22$; $V2 = 0.19$; $V3 = 0.20$; $V4 = 0.18$; $V5 = 0.19$ for the WP method.

From the calculation of the following alternative values, the highest value obtained is the alternative $V1 = 94$ for SAW and $V1 = 0.22$ for WP. Of the 5 alternatives that were tested with 4 criteria, it was obtained that the puskesmas considered to have the best performance, namely alternative V1 (UPT Puskesmas Pagelaran).

Suggestion

With the existence of a decision support system by applying the SAW and WP methods, the Puskesmas assessment data process is more effective so that the community and assessors can be more quickly get the best health center assessment information.

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