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IMPLEMENTATION OF THE VIKOR METHOD FOR DECISION MAKING ON THE ELIGIBILITY OF SOCIAL ASSISTANCE IN THE TPS3R AREA OF PRINGSEWU DISTRICT

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Abstract
Poverty is a major social welfare problem in Indonesia. Various efforts have been made by the government to overcome the main problem of social welfare in accordance with the Republic of Indonesia Constitution Number 11 of 2009 concerning social welfare, such as providing social assistance, social rehabilitation, social security, social empowerment, and social protection. Areas that sometimes reflect the large number of poor and underprivileged people are often located in slum areas on the outskirts of the city which are sometimes free from supervision and control from the local government. The Reduce, Reuse, Recycle Waste Management Site (TPS3R) which is a waste management system and technology that is intended as a solution to overcome the problem of waste and its impacts. Through this TPS3R, not only the problem of environmental pollution caused by waste can be reduced, but also products with economic value are produced from waste that is processed by involving the surrounding community so that it obtains benefits. In addition to involving the community to obtain benefits from the existence of TPS3R, this study will examine the variables that determine the eligibility of social assistance recipients using the Bivariate Person and Alpha-Cronbach methods, the aim is to provide social security to the community in the TPS3R area in maintaining the sustainability of the area to remain clean and healthy. To optimize the determination of the eligibility of assistance recipients in the TPS3R area of Pringsewu Regency, the determining criteria will be applied to a system using the Decision Support System model with the implementation of website-based tool tests. By using a website-based system, poverty alleviation programs in the TPS3R area of Pringsewu Regency can be carried out quickly, effectively and efficiently and on target.

I. INTRODUCTION

Developing countries are often faced with Social Welfare problems, social welfare problems arise due to income inequality. Income inequality is the main factor causing poverty which is the main problem of social welfare. Poverty is a condition when there is an inability to meet basic needs such as food, clothing, shelter, education, and health. Poverty can be caused by the scarcity of basic needs fulfillment tools, or the difficulty of access to education and employment. The government currently has various integrated poverty alleviation programs ranging from poverty alleviation programs based on social assistance, poverty alleviation programs based on community empowerment, and poverty alleviation programs based on small business empowerment which are run by various elements of the Government, both central and regional, as an effort to increase the effectiveness and

efforts to overcome poverty in accordance with the Republic of Indonesia Constitution Number 11 of 2009 concerning social welfare. The implementation of Social Welfare is a directed, integrated, and sustainable effort carried out by the Government, local governments, and the community in the form of social services to meet the basic needs of every citizen, which includes social rehabilitation, social security, social empowerment, and social protection. However, in its implementation, the achievement of the objectives of the poverty alleviation program is still not optimal. This is indicated by the large number of poor people in Indonesia. Based on the Central Statistics Agency, the number of poor people in Indonesia in March 2022 was 26.16 million people. Meanwhile, Lampung Province itself contributed 8.31% of the poor population in urban areas and 13.14% in rural areas, so that overall Lampung has a poor population of 11.57%. The poverty alleviation program has not been optimal with poverty alleviation programs based on social assistance, community empowerment, and small business empowerment because uncertain criteria must be met so that a family is eligible to receive poverty alleviation assistance. The TPS3R area of Pringsewu Regency has a description with an area of: 31,929 Ha. Slum area: 34.08 Ha. Position: 0497469 N – 9407036 E Covers: Pringsewu District, 4 Sub-districts of West Pringsewu, East Pringsewu, North Pringsewu, South Pringsewu, Topographic conditions: Relatively flat with a slope of 0-15%. With Slum Category: Medium Slum. Typology: Downtown Area, Area Characteristics: Slum area in lowland urban areas. This can be seen in the following profile of the Sakai Sambaiyan area of Pringsewu Regency:

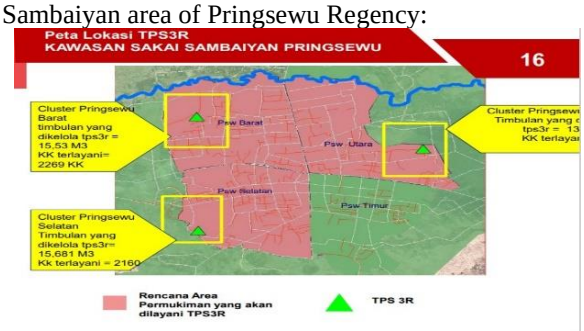

Figure 1. Location Profile of TPS3R Pringsewu
Source: KOTAKU Pringsewu Team

From Figure 1, it is clear that the community served is more than 5000 families, thus allowing for inequality in control and provision to the poor. This study will determine the criteria used as calculation parameters to determine recipients of social assistance for poverty alleviation programs so that they are right on target. The data verification and confirmation mechanism is still not neat so that data duplication often occurs. Optimization of poverty alleviation programs based on social assistance in the TPS3R area can be done by utilizing the *Digital Based Social Assistance concept*. Technological developments can be utilized to create an innovation in poverty alleviation programs based on social assistance. By using the Digital system, determining recipients of social assistance can be done quickly, effectively and efficiently and right on target. [1] [2] [3] [4] [5]

The research that will be developed will test the variables for determining the eligibility of aid recipients using validity and reliability tests. The tested outcome variables will then be used as the basis for the weighting of values for each variable using the Vikor Method and tested using *Website* -based *Software*. The Website System will be built using the UML Model with *Use Case Diagram Structure, Activity Diagram, Class Diagram* as a storage *database* with a large amount of data. The test results will be a reference for the Regional Government and TPS3R Managers in determining prospective recipients of Social Assistance.

II. RESEARCH METHODS

2.1. VIKOR Method

The research conducted using the VIKOR method as the basis for solving the problem. The VIKOR method is one of the *Multi-Criteria Decision Making* (MCDM) methods [6], [7] . This method also considers *the trade-off* between the advantages and disadvantages of each alternative and provides compromise results according to the preferences of the decision maker. The VIKOR method is used because there are several alternatives and several criteria that need to be considered in decision making [8] [9], [10] . Before applying the criteria that are the reference for decision making in the VIKOR method, the criteria will first be tested for validity and reliability. The criteria used to measure the eligibility of recipients of social assistance in the TPS3R area are Domicile, Family Economic Status, Occupation, Income, Recipient Status, Number of Dependents, House Condition.

Table 1. Eligibility Criteria for Recipients of Social Assistance in the TPS3R Region

No	Variables
1.	Domicile
2.	Family Economic Status
3.	Work
4.	Income
5.	Aid Recipient Status
6.	Number of Dependents
7.	House Condition

1. Validity Test *(Bivariate Person – Product Moment)*

The method used to test validity in this study is *Bivariate Person (Product Moment)* with the equation

$$r_{ix} = \frac{n\sum ix-(\sum i)(\sum x)}{\sqrt{\lceil n\sum i^2-(i)^2\rceil\lceil n\sum x^2-(\sum x)^2\rceil}} \quad (1)$$

Where:

r_{ix} = Item – total correlation coefficient *(bivariate person)*
i = Item score
r = Total score
n = number of subjects who took the test

with Testing Criteria:

a. If r count > r table (2-sided test with significance of 0.05) then the instrument or statement items are significantly correlated with the total score **(declared valid).**
b. If r count < r table (2-sided test with significance of 0.05) then the instrument or statement items do not correlate significantly with the total score **(declared invalid).**

$$r_{xy} = \frac{n\sum XY - (\sum X)(\sum Y)}{\sqrt{\lceil n\sum X^2 - (\sum X)^2\rceil\lceil n\sum Y^2 - (\sum Y)^2\rceil}}$$

$$r_{xy} = \frac{109(21184) - (492)(4623)}{\sqrt{\lceil 109(2286) - (492)^2\rceil\lceil 109(199859) - (4623)^2\rceil}}$$

$$r_{xy} = \frac{2309056 - 2274516}{\sqrt{\lceil 24917 - 242064\rceil\lceil 21784631 - 21372129\rceil}}$$

$$r_{xy} = \frac{34540}{\sqrt{\lceil 7110\rceil\lceil 412502\rceil}}$$

$$r_{xy} = \frac{34540}{\sqrt{2932889220}}$$

$$r_{xy} = \frac{34540}{541561559} = 0{,}6378$$

2. Reliability Test *(Alpha-Cronbach)*

The reliability test method in this study uses the *alpha formula (Cronbach).* The alpha formula is a procedure for finding reliability values without requiring items into two groups (can also be applied to the split-half technique), so it can be applied to instruments with an odd number of items. Reliability testing uses the equation

$$r_{ac} = \left\lfloor\frac{k}{k-1}\right\rfloor\left\lceil 1 - \frac{\sum \sigma b^2}{\sigma_{t^2}}\right\rceil \quad (2)$$

Where:

r_{ac} = Instrument Reliability
k = Number of questions
$\sum \sigma b^2$ = Number of item variants
σ_{t^2} = Total variance

with the significance test assessment criteria carried out at a significance level of 0.05, meaning that the instrument can be said to be reliable if the alpha value is greater than the critical r product moment.

$$r_{ac} = \left\lfloor\frac{k}{k-1}\right\rfloor\left\lceil 1 - \frac{\sum \sigma b^2}{\sigma_{t^2}}\right\rceil$$

$$r_{ac} = \left\lfloor\frac{7}{7-1}\right\rfloor\left\lceil 1 - \frac{5.614849}{14.31991}\right\rceil$$

$$r_{ac} = \lfloor 1.1667\rfloor\lceil 0.607899202\rceil$$

$$r_{ac} = 0.709215735$$

Based on the results of the validity and reliability tests that have been carried out, the 7 criteria presented are said to be reliable.

2.2. Research Flow Chart

Research flowcharts help researchers to clarify the process and flow of research that must be carried out. This can help researchers avoid errors and mistakes in the research process and ensure that the research can make a significant contribution.

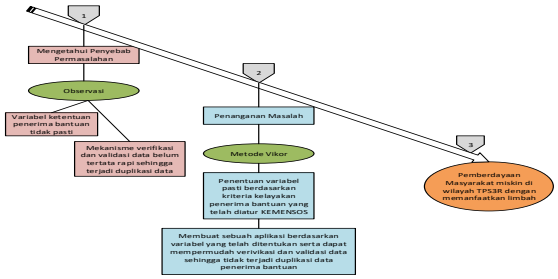

Figure 2. Research Flowchart

In this research, it will be divided into three stages as explained in the following explanation:

Stage 1 In this stage, the research team identified problems arising from the construction of TPS3R in the West Pringsewu area by involving the TPS3R Manager and reviewing the results of *the Feasibility Study* obtained from the PUPR Service through the KOTAKU Division of Pringsewu Regency. Furthermore, verifying the Criteria and Variables of Community Involvement.

Stage 2 Results of *Feasibility Study* Analysis The research team conducted a mapping of research problems and determined the variables to be tested using the VIKOR Method using variables from KOTAKU Pringsewu and Kemensos Data to be collaborated into variables to be tested with the Website System. The results of the Website System Test will be disseminated at the KOMPAS IPTEK Regional Innovation activity by BAPPEDA Pringsewu Regency.

Stage 3 Website System Testing with Variables that have been tested for validity and reliability will be adopted by TPS3R Pringsewu Barat as a Tool for Determining Assistance for Communities in the TPS3R area.

III. RESULTS

3.1. Determining Index Values

$Q_1 = (\frac{SI-S^-}{S^+-S^-})V + (\frac{R_1-R^-}{R^+-R^-})(1\text{-}V)$

Note: S^- = Min SI
S^+ = Max SI
R^- = Min RI
R^+ = Max RI
V = 0.5

$Q_1 = \left(\frac{0,478-0,304}{0,99-0,304}\right)0,5 + \left(\frac{0,208-0,138}{0,332-0,138}\right)(1-0,5)$
$= \left(\frac{0,174}{0,686}\right)0,5 + \left(\frac{0,07}{0,194}\right)(0,5)$
= (0.253) 0.5 + (0.360) (0.5)
= 0.127 + 0.18
= 0.307

$Q_2 = \left(\frac{0,616-0,304}{0,99-0,304}\right)0,5 + = \left(\frac{0,249-0,138}{0,332-0,138}\right)(1-0,5)$
$= \left(\frac{0,312}{0,686}\right)0,5 + \left(\frac{0,111}{0,194}\right)(0,5)$
= (0.455) 0.5 + (0.572) (0.5)
= 0.228 + 0.286
= 0.514

$Q_3 = \left(\frac{0,781-0,304}{0,99-0,304}\right)0,5 + \left(\frac{0,207-0,138}{0,332-0,138}\right)(1-0,5)$
$= \left(\frac{0,477}{0,686}\right)0,5 + \left(\frac{0,069}{0,194}\right)(0,5)$
= (0.695) 0.5 (0.013) (0.5)
= 0.347 + 0.006
= 0.353

$Q_4 = \left(\frac{0,567-0,304}{0,99-0,304}\right)0,5 + \left(\frac{0,208-0,138}{0,332-0,138}\right)(1-0,5)$
$= \left(\frac{0,263}{0,686}\right)0,5 + \left(\frac{0,07}{0,194}\right)(0,5)$
= (0.383) 0.5 + (0.360) (0.5)
= 0.191 + 0.18
= 0.371

$Q_5 = \left(\frac{0,387-0,304}{0,99-0,304}\right)0,5 + \left(\frac{0,166-0,138}{0,332-0,138}\right)(1-0,5)$
$= \left(\frac{0,083}{0,686}\right)0,5 + \left(\frac{0,028}{0,194}\right)(0,5)$
= (0.120) 0.5 + (0.144) (0.5)
= 0.06 + 0.072
= 0.132

$Q_6 = \left(\frac{0,491-0,304}{0,99-0,304}\right)0,5 + \left(\frac{0,208-0,138}{0,332-0,138}\right)(1-0,5)$
$= \left(\frac{0,187}{0,686}\right)0,5 + \left(\frac{0,07}{0,194}\right)(0,5)$
= (0.272) 0.5 + (0.360) (0.5)
= 0.136 + 0.18
= 0.316

$Q_7 = \left(\frac{0,491-0,304}{0,99-0,304}\right)0,5 + \left(\frac{0,166-0,138}{0,332-0,138}\right)(1-0,5)$
$= \left(\frac{0,187}{0,686}\right)0,5 + \left(\frac{0,028}{0,194}\right)(0,5)$
= (0.272) 0.5 + (0.144) (0.5)
= 0.136 + 0.072
=0.208

$Q_8 = \left(\frac{0,997-0,304}{0,99-0,304}\right)0,5 + \left(\frac{0,332-0,138}{0,332-0,138}\right)(1-0,5)$
$= \left(\frac{0,693}{0,686}\right)0,5 + \left(\frac{0,194}{0,194}\right)(0,5)$
= (1.010) 0.5 + (1) (0.5)
= 0.505 + 0.5
= 1.005

$Q_9 = \left(\frac{0,*374-0,304}{0,99-0,304}\right)0,5 + \left(\frac{0,208-0,138}{0,332-0,138}\right)(1-0,5)$
$= \left(\frac{0,07}{0,686}\right)0,5 + \left(\frac{0,07}{0,194}\right)(0,5)$
= (0.102) 0.5 + (0.360) (0.5)
= 0.051 + 0.18
= 0.231

$Q_{10} = \left(\frac{0,831-0,304}{0,99-0,304}\right)0,5 + \left(\frac{0,249-0,138}{0,332-0,138}\right)(1-0,5)$
$= \left(\frac{0,527}{0,686}\right)0,5 + \left(\frac{0,111}{0,194}\right)(0,5)$
= (0.768) 0.5 + (0.572) (0.5)
= 0.384 + 0.286
= 0.67

$Q_{11} = \left(\frac{0,574-0,304}{0,99-0,304}\right)0,5 + \left(\frac{0,208-0,138}{0,332-0,138}\right)(1-0,5)$

$= \left(\frac{0,27}{0,686}\right) 0,5 + \left(\frac{0,07}{0,194}\right)(0,5)$
$= (0.393)\ 0.5 + (\ 0.360)\ (0.5)$
$= 0.196 + 0.18$
$= 0.376$

$Q_{12} = \left(\frac{0,401-304}{0,99-0,304}\right) 0,5 + \left(\frac{0,138-138}{0,332-0,138}\right)(1-0,5)$
$= \left(\frac{0,097}{0,686}\right) 0,5 + \left(\frac{0}{0,194}\right)(0,5)$
$= (0.141)\ 0.5 + (0)\ (0.5)$
$= 0.070 + 0$
$= 0.070$

$Q_{13} = \left(\frac{0,99-0,304}{0,99-0,304}\right) 0,5 + \left(\frac{0,208-138}{0,332-0,138}\right)(1-0,5)$
$= \left(\frac{0,686}{0,686}\right) 0,5 + \left(\frac{0,07}{0,194}\right)(0.5)$
$= (1)\ (0.5) + (0.360)\ (0.5)$
$= 0.5 + 0.18$
$= 0.68$

$Q_{14} = \left(\frac{0,304-0,304}{0,99-0,304}\right) 0,5 + \left(\frac{0,166-138}{0,332-0,138}\right)(1-0,5)$
$= \left(\frac{0}{0,686}\right) 0,5 + \left(\frac{0,028}{0,194}\right)(0,5)$
$= (0)\ 0.5 + (0.144)\ (0.5)$
$= 0 + 0.072$
$= 0.072$

$Q_{15} = \left(\frac{0,678-0,304}{0,99-0,304}\right) 0,5 + \left(\frac{0,208-138}{0,332-0,138}\right)(1-0,5)$
$= \left(\frac{0,374}{0,686}\right) 0,5 + \left(\frac{0,07}{0,194}\right)(0,5)$
$= (0.545)\ 0.5 + (0.360)\ (0.5)$
$= 0.272 + 0.18$
$= 0.452$

Application testing in order to improve the effectiveness and efficiency of social assistance distribution at TPS3R Pringsewu, using a decision-making application that is able to assess the eligibility of aid recipients objectively and transparently. One method that can be used in this decision-making process is the VIKOR Method, the results of the manual test above are then implemented using a mobile web application with the following display:

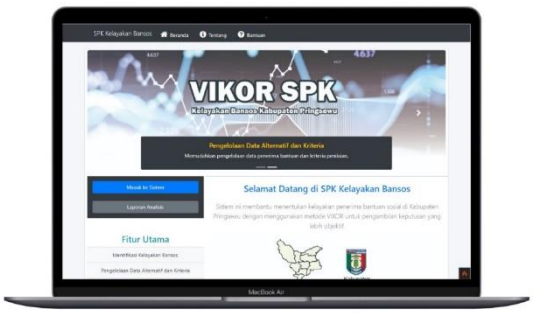

Figure 3. Application Home Menu Display

The results of the application test using the VIKOR method using the following criteria resulted in the ranking:

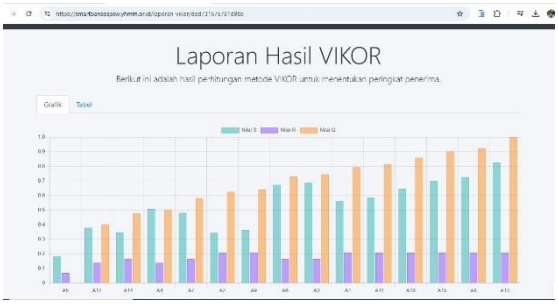

Figure 4. Application Test Results and Ranking

V. CONCLUSION

This application is able to reduce the time required to assess the eligibility of aid recipients compared to manual methods. In addition, the use of the VIKOR method ensures that the calculation of each alternative is carried out accurately and consistently, minimizing the potential for errors in the selection process *of the variables* used Domicile, Family Economic Status, Occupation, Income, Recipient Status, Number of Dependents, House Condition. With this application, each stage of decision making can be traced and accounted for, resulting in a more transparent aid distribution process. The criteria and weights used in the evaluation can be seen clearly, making decisions easier to understand by interested parties. The implementation of this application supports TPS3R Pringsewu in distributing social assistance to those who really need it according to the priorities that have been set. This not only increases the efficiency of aid, but also ensures greater social benefits for the surrounding community.

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