



## Decision Support System for Raskin Recipients Recommendation Using Simple Multi Attribute Rating Technique Exploiting Ranks Method

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### ABSTRACT

The problem of poverty is a classic problem that occurs in every country, both developed and developing countries such as Indonesia. In every country there are many programs carried out by the government to overcome the problem of poverty, one of which is the RASKIN program carried out by the Indonesian government. The method used to complete this research is SMARTER (Simple Multi Attribute Rating Technique Exploiting Ranks). This method was chosen because the SMARTER method is a form of decision support model used in decision making with several attributes that will be used to solve decision making problems. The research was conducted in Sei Beluru Village, Meranti District, Asahan Regency. In Sei Beluru Village, the criteria are the floor area of the house, type of house floor, type of house walls, defecation facilities, drinking water sources, lighting, fuel used, frequency of eating, ability to buy meat, ability to buy clothes, ability to seek treatment, monthly income, education of head of household, ownership of assets. Decision support systems with smarter methods are able to analyze data on people who are entitled to receive Raskin assistance

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### 1. Introduction

Poverty[1] is one of the problems that arise in the development[2] together with the problem of unemployment[3] and the gap where the three are intertwined. In the context of development in Indonesia, the problem of poverty has increasingly become a prima donna since the economic crisis[4] hit Indonesia in mid-1997. Poverty is increasingly becoming a conversation because of the increasing number of poor people[5] sharp enough caused by the economic crisis[6] NS. Poverty in Indonesia has now become a national problem that even the government is trying to eradicate[7] Indonesia from the problem of poverty.

Improving people's welfare[8] become a priority in the development plan[9] national medium term, which includes 5 main targets, namely: reducing poverty and unemployment, reducing disparities between regions, improving human quality,[10] environmental quality improvement, natural resource management, and infrastructure improvement. In its implementation, the main priority is given to the maintenance of people's welfare, institutional arrangement and implementation of the social system. The targets to be achieved in this system include increasing people's welfare[11] especially the poor. Raskin Program[12] as one of the social assistance programs[13] a family-based program that has been running regularly since 1998. Through this program, the government provides assistance to the poor to get the right to food. However, the fact is that the Raskin program in its implementation has resulted in many irregularities committed by government officials, both from unequal distribution, corruption, and Bulog's readiness.[14] to give Raskin to the community culture shock.

This fact has become one of the problems faced by the government so far. Therefore, to help speed up and simplify and reduce subjectivity in the decision-making process, in this case the determination of



Raskin recipients requires a decision support system (Decision Support System). Its purpose is to assist decision making. One of them is to use the SMARTER method[15] (Simple Multi-Attribute Ranking Technique Utilizing Ranking).

If the decision-making process is assisted by a computerized decision support system, it is hoped that subjectivity in decision-making can be reduced by applying all criteria for all potential recipients of Raskin assistance. So only participants are correct indeed expected to be selected. However, in this system the important role is the decision maker because the system only provides alternative decisions, while the final decision is still determined by the decision maker.

## 2. METHOD

### 2.1 Management Decision Making

The decisions taken by the Manager may vary according to the level of Management. The following figure 2.1 describes the levels of management in the organization.



**Figure1.** Management Hierarchy  
Source: (Kusrini. 2007: 8)

The top level is strategic management, which consists of senior personnel from top management. Its activities are selecting long-term goals, allocating resources, and developing the policies necessary to achieve these goals. For example, management determines what products to sell and which markets to target.

The level below the strategic management level, that is, the tactical management level, consists of middle-level management personnel. Activities at the management level are translating long-term goals into more detailed and more quantitative (measurable) plans and objectives for the operations department. An example of an activity at this level is determining production targets for each product.

At the lowest level is operations management. The number of managers at this level is the most compared to other levels. Its activity is to observe daily activities and ensure that plans are followed and goals are achieved. An example of a management activity at this level is observing daily manufacturing activities to ensure that production quotas are achieved.

### 2.2 Decision Support System

A decision support system (DSS) is an interactive information system that provides information, modeling, and manipulating data. This system is used to help decision makers in semi-structured and unstructured situations, where no one knows for sure how decisions should be made.

Decision support systems are usually created to support the solution of a problem or to evaluate an opportunity. Such an SPK is called a DSS application. DSS applications are used for decision making. The

DSS application uses a flexible, interactive and customizable CBIS (Computer Based Information System), which was developed to support solutions to unstructured specific management problems.

DSS applications that use data provide an easy user interface and can incorporate the thinking of decision makers. DSS is more intended to support management in carrying out analytical work in situations that are less structured and with less clear criteria. DSS is not intended to optimize decision making, but provides interactive tools that allow decisionmakers to perform various analyzes using available models. (Kusrini, 2007:15).

### 2.3 Characteristics of Decision Support Systems

The following characteristics are expected to be included in a DSS (Turban, E., 2005):

1. Support for decision makers, especially in semi-structured and structured situations, by incorporating human judgment and computerized information. These problems cannot be solved by other computer systems or standard quantitative methods or tools.
2. Complete support for all managerial levels, from top executives to managers
3. Support for individuals and groups. Less structured problems often require the involvement of individuals from different departments and levels of the organization or even from other organizations.
4. Support for independent decisions. Decisions can be made once, several times or repeatedly (within the same interval).
5. Support in all phases of the decision-making process: intelligence, design, choice and implementation.
6. Support shared decision-making processes and styles.
7. Adaptation over time. Decision making must be reactive, able to deal with changing conditions quickly, and adapt DDS to meet these changes. DDS is flexible. Therefore, users can add, remove, combine, modify, or rearrange basic elements. DSS is also flexible because it can be modified to solve other similar problems.
8. Users feel right at home. Home users, very powerful graphics capabilities, and an interactive human-machine interface with a single natural language can greatly increase the effectiveness of a DSS.
9. Increased decision-making effectiveness (accuracy, timeliness, quality) rather than efficiency (decision-making costs). When DDS is deployed, decision-making often takes longer, but the results are better.
10. Full control by the decision maker over all steps of the decision-making process in solving a problem. DDS by specifically emphasizes to support decision making, not replace.
11. End users can develop and modify simple systems themselves. Larger systems can be built with the help of information systems experts. OLAP software along with data warehouses allows users to build quite large and complex DDSs.
12. Usually, models are used to analyze decision-making situations. The modeling capabilities allow experimentation with different strategies under different configurations.
13. Access is provided for a variety of data sources, formats, and types, from geographic information systems (GIS) to object-oriented systems.
14. It can be used as a standalone tool by decision makers in one location or distributed across the organization as a whole and across multiple organizations along the supply chain. It can be integrated with other DDS or other applications, and can be distributed internally and externally using network and Web technologies.

### 2.4 Definition of Poor

Poverty is a condition where there is an inability to meet basic needs such as food, clothing, housing, education, and health. Poverty can be caused by the scarcity of basic needs, or the difficulty of accessing education and employment. Poverty is a global problem. Some people understand [16] this term is subjective and comparative, while others see it from a moral and evaluative point of view, and still others understand it from an established scientific point of view.

Causes of poverty are related to:

- a. Individual or pantological causes, which cause poverty as a result of the behavior, choices or abilities of



- the poor.
- Family causes link poverty with family education.
  - Causes of subcultures (subcultures) that link poverty with everyday life. learned or practiced in the environment.
  - Agency causes, which view poverty as a consequence of the actions of others include war, government and theeconomy.
  - Structural causes, which give the reason that poverty is the result of social structures. Source: <http://id.wikipedia.org/wiki/Poverty>.

## 2.5 Raskin

The Raskin program is one of the poverty alleviation and social protection programs in the food sector organized by the Central Government in the form of subsidized rice assistance to low-income households (poor and vulnerable households).

The Raskin program is a cross-sectoral national program both vertically (Central Government to Regional Government) and horizontally (across Ministries/Agencies), so that all relevant parties are responsible according to their respective main tasks and functions for the smooth implementation and achievement. of the goals of the Raskin Program. .

Raskin is a food subsidy in the form of rice aimed at low-income households as an effort from the government to improve food security and provide social protection to foster households. The success of the Raskin program is measured bythe level of achievement of the 6T indicators, namely: right target, right quantity, right price, right time, right quality, and right administration. This program aims to reduce the expenditure burden of Target Households (RTS) by fulfilling several basic food needs in the form of rice and preventing a decrease in energy and protein consumption. determined.

The Raskin program aims to reduce the burden of spending on target households in meeting their basic food needs in the form of rice. Furthermore, the Raskin program aims to help the poor and vulnerable groups to obtain adequate food and carbohydrate nutrition without problems.(Source:<http://www.tnp2k.go.id/id/tanya-tangan/klaster-i/rice-bersubsidi-bagi-Rumah-Berpenghasilan-low-raskin/>).

## 2.6 Simple Multi Attribute Ranking Technique, Exploitation Ranking Method

The SMART (Simple Multi-Attribute Rating Technique Exploiting Ranks) method is a development of the previous method, the SMART (Simple Multi-Attribute Rating Technique) method. The SMART method was first introduced by Edward in 1971 and named the SMART method in 1977. Since its inception, the SMART method has been developed into the SMARTS (Simple Multi-Attribute Rating Technique Swing) method and after being modified and improved by Edward and Baron in 1994 became the SMARTER method (Simple Multi-Attribute Rating Technique Exploiting Ranks).

The difference between the SMART method and the SMART and SMARTS methods lies in the weighting method. The weighting of the criteria in the method depends on the order of attribute priority where the first order is occupied by the attribute that is considered the most important. In the SMART and SMART methods, the weighting is given directly by the decision maker. However, the weighting procedure is considered disproportionate where each weight given must reflect the distance and priority of each criterion correctly. To overcome this, the SMARTER method uses the Rank Order Centroid weighting formula (Afiefah Rahmah, SPK Student Admission Selection using the SMARTER method, 2013:15).

Smart formula

$$\text{Maximize } \sum W_j \cdot U_{ij}, \forall i = 1, \dots, n$$

Information:



$w_j$  is the weighted value of the  $j$ th criterion of  $k$  criteria,  
 $u_{ij}$  is the utility value of alternative  $i$  on criterion  $j$ .

Decision selection is to identify which of the  $n$  alternatives is has the largest function value.  
 The value of this function can also be used to rank  $n$  alternatives

**2.7 ROC (Rank Order Centroid) Weighting**

ROC is based on the importance or priority criteria. According to Jeffreys and Cockfield (2008). The ROC technique gives weight to each criterion according to the ranking that is assessed based on the priority level. Usually formed with the statement "criterion 1 is more important than criterion 2, which is more important than criterion 3" and so on until the  $n$ th criterion. ROC weighting with a simple mathematical priority procedure. The basic idea can be illustrated with 2 attributes, A and B. If A ranks first, then its weight must be between 0.5 and 1 so that the midpoint of the 0.75 interval is taken as the approximate weight, which is the basis of the minimum commitment principle. B's weight will be 0.25 (which is the midpoint between 0 and 0.5). This procedure can be formulated as follows (if criteria  $K$ ).

Furthermore, if  $k$  is the number of criteria, then:

$$W1 = k \frac{(1 + \frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{k})}{k}$$

$$W2 = k \frac{(0 + \frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{k})}{k}$$

$$W3 = k \frac{(0 + 0 + \frac{1}{3} + \dots + \frac{1}{k})}{k}$$

In general, the ROC weighting can be formulated as follows:

$$Wk = \binom{k}{k} > \dots > \binom{k}{i}$$

$i=1$

**2.8 Steps SMART Method**

The steps of the SMARTER method are as follows:

1. Identify the problem so that the decisions to be taken are more focused and do not deviate from the goals to be achieved.
2. Determine alternative criteria and sub-criteria that will be used in decision making.
3. Give a rating for each criterion and sub-criteria.
4. Calculates the weights using the ROC weights for each criterion, this depends on the rating given in step 3.
5. The weight calculation uses ROC for each sub-criteria, this depends on the rating that has been given in step 3.
6. Calculate the final weight of each criterion, by exchanging the results of step 4 with the results of step 5. (AfiefahRahmah, Selection of SPK Student Admissions using the SMARTER method, 2013:18). ]

**2.9 Problem Analysis**

Analyze and collect all the requirements needed in the implementation of the recommendation decision support system to determine the recipients of Raskin assistance. In this section, we will analyze why Sei Beluru Meranti Village needs a decision support system to determine recommendations for Raskin recipients. So far, the Village Head in Sei Beluru Village has set recommendations for Raskin beneficiaries



based on reports provided by each neighborhood head who still uses a manual system and is very simple in processing data on Raskin beneficiaries, namely in the form of viewing and storing file records. So it takes time to determine who is entitled to receive Raskin assistance.

Difficulties will arise because there is quite a lot of community data that must be processed and the time available to process the data is not much. One of the problems above can cause village heads to be late in setting recommendations for recipients of community assistance for Raskin, another factor that can cause delays in determining recommendations for beneficiaries. Raskin is a data processing using a manual system that takes a long time, because the existing data must be recapitulated first, then processed to determine recommendations for recipients of community Raskin assistance. In processing this data, sometimes errors occur in determining the recommendations for recipients of community assistance for Raskin, because the results obtained are not in accordance with the capabilities of the community. This can be detrimental to society.

### 3. Results And Discussion

#### 3.1 Method Algorithm

##### 1. Weighting Algorithm

Enter : K1, K2, K3, K4, K5,  
K6, K7 = Criteria  
Adi, Sunar, Tough =  
Alternative

Output : wk (weight value)

Process:  $K1 = (1 + 1/k + 1/k + 1/k + 1/k + 1/k + 1/k)/k = \text{week}$

$K2 = (1/k + 1/k + 1/k + 1/k + 1/k + 1/k)/k = \text{week}$

$K3 = (1/k + 1/k + 1/k +$

$1/k + 1/k)/k = \text{week}$

$K4 = (1/k + 1/k + 1/k + 1/k)/k =$

$\text{week}$

$K5 = (1/k +$

$1/k + 1/k)/k =$

$\text{week}$

$K6 = (1/k + 1/k)/k =$

$\text{week}$

$K7 = (1/k)/k = \text{week}$

##### 2 Preference Value Algorithm

Enter :  $W_j =$  Criteria weight value

$W_k =$  Sub-

criteria

weight value

$U_{ij} =$

Indicator

Weight Value

Output : Rating for each alternative

Process :

$nM_e = W_j * W_k * U_{ij}$

Print  $nM_e$

Finished

#### 3.2 Program Implementation

The test carried out is a method test (*test method*) using a smarter method. The smarter method is a framework for making decisions effectively. Method testing focuses on visible user actions and users can recognize the output of the system, this test runs the system in an active environment using the correct data.

At this testing stage, only administrators have full access rights to the system.

### 3.3 Program Implementation Design

The implementation design is an overview of the program if it is designed in a programming language, the application used in the decision support system for determining good land suitability for oil palm plantations using the Visual Basic 2008 programming language, the following is a display of the design results in Visual Basic 2008

*Shaping* This is used as the main display of the program before entering the main menu. Can be seen in the following image:

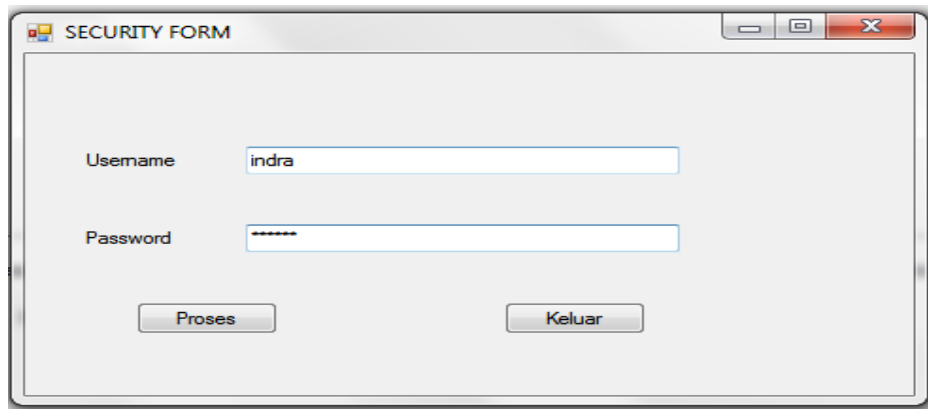


Figure 1. Security form

**Main Menu Form** *Shaping* This is used as the main menu display for the program, as shown in the following figure:

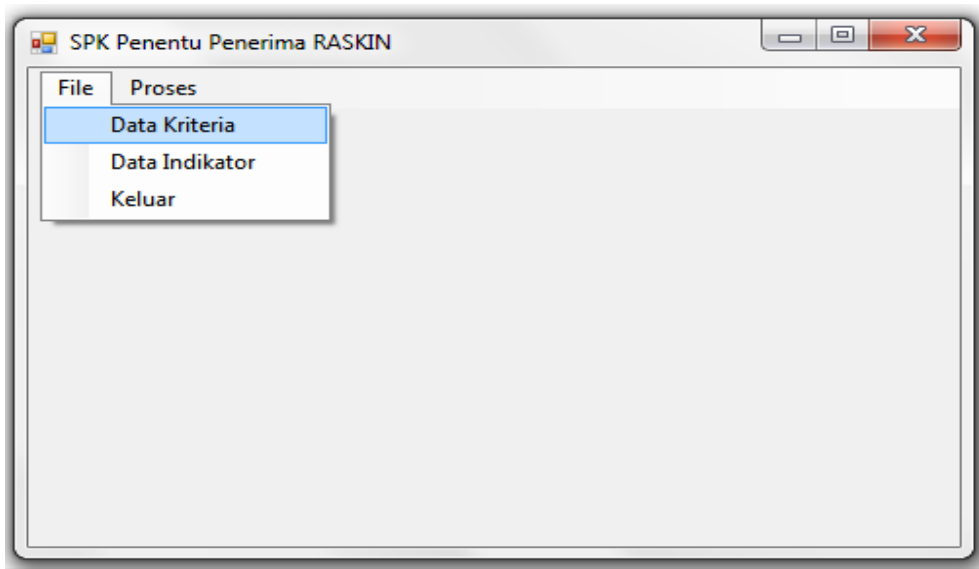


Figure 2. Main course

### Criteria Form

*Shaping* This is used as a place for Input Criteria Data from the program, it can be seen in the following image:

ID Kriteria	Prioritas	Nama Kriteria
A1	1	Fisik
A2	2	Non-Fisik

**Figure 3.** Criteria Form

### 3.4 Indicator Form

*Shaping* It is used as an input indicator, it can be seen in the following figure:

ID Kriteria	ID Indikator	Nama Indikator	Prioritas
A1	K1	Luas lantai rumah	1
A1	K2	Jenis lantai rumah	2
A1	K3	Jenis dinding rumah	3
A1	K4	Fasilitas Buang air	4
A1	K5	Sumber Air minum	5
A1	K6	Penerangan	6

**Figure 4.** Indicator Form

### Weighting Form

*Shaping* It is used to display the program weight, as shown in the following figure:

Nama	ID Kriteria	ID Indikator	Indikator	Prioritas	Bobot
Adi	A1	K1	Luas lantai rumah	1	0,37041
Adi	A1	K2	Jenis lantai rumah	2	0,22755
Adi	A1	K3	Jenis dinding rumah	3	0,15612
Adi	A1	K4	Fasilitas bang air	4	0,1085
Adi	A1	K5	Sumber Air	5	0,07279
Adi	A1	K6	Penerangan	6	0,04422
Adi	A1	K7	Bahan bakar yang dig...	7	0,02041
Adi	A2	K1	frekuensi makan	1	0,37041
Adi	A2	K2	kemampuan beli daging	2	0,22755
Adi	A2	K3	Kemampuan beli pakai...	3	0,15612

Figure 5. Weighting Form

**Shaping Results**

Shaping It is used to display the results, can be seen in the following image:

No	Nama	Nilai
1	Adi	0,295
2	Sunar	0,3592
3	Tegar	0,603

Figure 6. Result Form

**4. CONCLUSION**

The process of administering Raskin through a system can assist the government in determining objective and not subjective Raskin recipients and that the distribution of Raskin assistance is ultimately right on target. The process of determining the ranking of potential participants is carried out using a smarter



method, because this method selects the best alternative from several alternatives and uses more than one criterion (multi criteria). Where the criteria in question are the criteria used in determining the recipients of Raskin assistance set by BPS. This Decision Support System displays the ranking of potential participants as a material for consideration and a decision-making tool to determine which Raskin beneficiaries are considered truly worthy locations. The process must be carried out with complete data so that the assessment will be carried out objectively.

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