

Decision Support System for Regional Health Insurance Acceptance Using Simple Additive Weighting (SAW) Algorithm Case Study in Kepatihan District, Bojonegoro Regency

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ARTICLE INFO	ABSTRACT
Article history: Received Jun 09, 2020 Revised Jun 20, 2020 Accepted Jul 08, 2020	Decision Support System is a computer-based information system that is intended to assist decision making by utilizing certain data and models to solve various unstructured or semi-structured problems. The purpose of this study was to measure the accuracy and precision of the SAW (Simple Additive Weighting) algorithm in selecting desktop-based candidates for Regional Health Insurance. The decision support system that is built is expected to help sub-district staff in making decisions. This decision support system is made using the Java programming language and MySQL database. The method used is Simple Additive Weighting (SAW). The basic concept of the SAW method is to find the weighted sum of the performance ratings for each alternative. In this study the SAW method was chosen because this method is able to select the best alternative from a number of alternatives, in this case the alternative in question is the right to receive Regional Health Insurance based on predetermined criteria. The results of this study indicate that the decision support system using the SAW algorithm (Simple Additive Weighting) is precise and accurate in selecting JAMKESDA recipients as seen from the percentage comparison between SAW and Manual.
Keywords: Additive simple algorithm; MySQL; Classification.	

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1. INTRODUCTION

Nowadays technology has become an inseparable part of the life of every individual and organization. Technology is here to make it easier for users to get things done. The rapid development is not only hardware and software technology, but computing methods are also developing. One of the computational methods that are quite developed at this time is the method of decision-making systems (Decisions Support System). Decision support system (Decisions Support System) is an interactive computer system in helping decision making by using and utilizing data and models to solve semi-structured problems. One method that is often used is Fuzzy MADM (Multiple Attribute Decision Making).

The Fuzzy MADM (Multiple Attribute Decision Making) method is a method that can find the best alternative from various alternatives based on predetermined criteria. The Fuzzy MADM method has several algorithms including: Simple Additive Weighting (SAW), Weighted Product

(WP), ELECTRE, Technique for Order Preferences by Similarity to Ideal Solution (TOPSIS), Analytic Hierarchy Process (AHP). The SAW method is often known as the weighted addition method.

Regional Health Insurance (JAMKESDA) is an effort to maintain public health whose financing is managed in an integrated manner. The JAMKESDA program has several JAMKESDA acceptance criteria, namely: type of floor of residential building, type of wall of residential building, facilities for defecation, consumption of meat/chicken/milk per week, purchase of new clothes every year for household members, frequency of meals in a day, field the main occupation of the head of the family, the highest education of the head of the family, and the owner of the asset/price or immovable. In addition, JAMKESDA is a guarantee program for the payment of health service costs provided by the Regional Government of Bojonegoro Regency to the people of Bojonegoro Regency. The target of the Jamkesda Program is all people of Bojonegoro Regency who do not have health insurance in the form of Jamkesmas, ASKES and other health insurance. The types of health services covered by the JAMKESDA program include health services at Puskesmas and health services at hospitals. In this study, the Simple Additive Weighting (SAW) method was chosen because this method was able to select the best alternative from a number of alternatives, in this case the intended alternative was those who were entitled to receive regional health insurance (JAMKESDA) based on predetermined criteria. The SAW method was chosen to solve the division problem. In this study, the Simple Additive Weighting (SAW) method was chosen because this method was able to select the best alternative from a number of alternatives, in this case the intended alternative was those who were entitled to receive regional health insurance (JAMKESDA) based on predetermined criteria. The SAW method was chosen to solve the division problem. In this study, the Simple Additive Weighting (SAW) method was chosen because this method was able to select the best alternative from a number of alternatives, in this case the intended alternative was those who were entitled to receive regional health insurance (JAMKESDA) based on predetermined criteria. The SAW method was chosen to solve the division problem.

2. METHOD

From these problems, the research methodology used is as follows:

1. Problem Analysis

At this stage the aim is to analyze the problem to process the results of the interview to determine the requirements and data needed in the JAMKESDA acceptance process. Interviews were conducted to determine the needs and requirements for JAMKESDA acceptance. Interview activities were addressed to the Head of Kelurahan and Kependudukan sub-district officials. The results of these interviews will be used as input in the analysis phase. The process carried out aims to study the needs and requirements during the selection process for JAMKESDA recipients. System Development

2. System Development

At this stage the aim is to design and develop a decision support system for JAMKESDA acceptance that functions as a simulation of the SAW model testing.

3. System Testing

At this stage the aim is to test the system that has been created. The test of the system aims to determine the accuracy of using the SAW model in decision making on the JAMKESDA acceptance system. The testing process is carried out by simulating the system by inputting the data obtained from interviews and observations. The expected results are in the form of people who accept or do not receive JAMKESDA.

4. Data analysis

At this stage, it aims to assist the author in studying the test results obtained in the previous stages which are expected to assist in drawing conclusions from this research. In this stage, the input is in the form of data obtained from the results of interviews with the village head and

village officials. The data is in the form of citizen/community data as many as 39 people who can and cannot afford to receive JAMKESDA or who do not receive JAMKESDA. The next process is in the form of data analysis which is carried out by comparing the results of the decisions from the system with the original decisions from the kepatihan village data (manual results).

5. Drawing Conclusion

At this stage the author will draw a conclusion in the form of a decision on this research. The precision and accuracy of the SAW method in providing better decision results can be seen from the differences in the results of system decisions and the results of village decisions (manual). The accuracy of the SAW method for selecting prospective Jamkesda recipients is seen from the residents who are "not able" and these residents accept Jamkesda but in the manual decision the residents "do not accept" Jamkesda. Thus, the differences obtained from system and manual decisions prove that this system is appropriate and accurate in making decisions on JAMKESDA acceptance.

3. RESULTS AND DISCUSSIONS

1. Jamkesda System Testing

The data used in testing this system is 39 citizen data consisting of wealthy and poor citizens. The following is the data of prospective residents of Jamkesda recipients obtained from the manual data of the Kematihan Village, Bojonegoro Regency Residents can not afford and receive Jamkesda as many as 7 people, Residents cannot afford and do not receive Jamkesda as many as 4 people, Residents can afford and receive Jamkesda as much as 2 people.

Table 1.
Weight of Each Criterion

Code Criteria	Criteria Name	Criteria Weight
C1	Residential Building Floor	0.67
C2	Residential Building Wall	0.67
C3	Facilities for BAB	1.00
C4	Frequency of Meat/Dairy Consumption	1.00
C5	Frequency of Purchase of Clothing	0.67
C6	Frequency of eating in a day	0.33
C7	Main Job Field for Family Head	0.33
C8	Highest Education	1.00
C9	Owner of movable/immovable assets	0.33

The next stage is to give the value of each criterion to residents who receive Jamkesda. Each criterion has a sub-criteria that has a weight.

a. Criteria for Residential Building Floor Type (C1)

The weighting of the sub-criteria in criterion 1 (C1) is obtained from the calculation:

Table 2.
Weighting of Sub Criteria in Criterion 1 (C1)

Floor Type (X)	Mark
Land	0.33
Tile	0.67
ceramic	1.0

b. Residential Building Wall Criteria (C2)

The weight of the sub-criteria in criterion 2 (C2) is obtained from the calculation:

Table 3.

Weighting of Sub Criteria in Criterion 2 (C2)

Wall Type (X)	Mark
Bamboo Wall	0.33
Brick Wall	0.67
Smooth Wall	1.00

c. Criteria for Facilities for CHAPTER (C3)

The weighting of the sub-criteria in criterion 3 (C3) is obtained from the calculation:

Table 4.

Weighting of Sub Criteria in Criterion 3 (C3)

Venue Facilities CHAPTER (X)	Mark
Do not have	0.33
Simple	0.67
Modern	1.00

d. Criteria for Frequency of Purchase of Clothing (C5)

The weighting of the sub-criteria in criterion 5 (C5) is obtained from the calculation:

Table 5.

Weighting of Sub Criteria in Criterion 5 (C5)

Clothing Purchase (X)	Mark
Never	0.33
Every holiday	0.67
every 3 months	1.00

e. Criteria Frequency of eating in a day (C6)

The weighting of the sub-criteria in criterion 6 (C6) is obtained from the calculation:

Table 6.

Weighting of Sub Criteria in Criterion 6 (C6)

Eat in a day (X)	Mark
1 time a day	0.33
2 times a day	0.67
3 times a day	1.00

f. Criteria for Main Job Field for Head of Family (C7)

The weighting of the sub-criteria in criterion 7 (C7) is obtained from the calculation:

Table 7.

Weighting of Sub Criteria in Criterion 7 (C7)

Main Employment Field(X)	Mark
Laborer	0.33
Trader/Entrepreneur/Peg.private	0.67
civil servant	1.00

g. Highest Education Criteria (C8)

The weighting of the sub-criteria in criterion 8 (C8) is obtained from the calculation:

Table 8.

Weighting of Sub Criteria in Criterion 8 (C8)

Highest Education (X)	Mark
finished elementary school	0.25
High school graduate	0.5
finished high school	0.75
Graduated D3/S1/S2	1.00

h. Criteria for Owners of movable/immovable assets (C9)

The weighting of the sub-criteria in criterion 9 (C9) is obtained from the calculations:

Table 9.

Weighting of Sub Criteria in Criterion 9 (C9)

Assets (X)	Mark
Do not have	0.33
Property for sale < 500 thousand	0.67
Property for sale > 500 thousand	1.00

After weighting each sub-criteria for each citizen, the next stage is simulation. The simulation process uses the Simple Additive Weighting (SAW) method. The weights that have been saved will be calculated by the saw algorithm which results in the final score or total score. The next stage after the final total score is calculated, inputting the benchmark score for checking Jamkesda acceptance. The use of this benchmark score as a standard for passing the applicant accepts or does not receive Jamkesda. The value range is divided into 3, namely: low, medium, and high. The range given is seen from the results of manual calculations which have the highest score of 6.99. The range of values used for benchmark scores are.

Table 10.

Scoring Benchmark Value Range

Value Range	Mark
0-2.99	Low
3.00-4.99	Currently
5.00-6.99	tall

This simulation process uses a benchmark score of 3.8. From the benchmark score, the residents will decide whether to accept or not to accept Jamkesda. Residents who receive Jamkesda are residents who have a total final score of more than or equal to the benchmark score entered.

4. CONCLUSION

From the implementation of Simple Additive Weighting on the JAMKESDA acceptance selection decision support system, it can be concluded that the Simple Additive Weighting algorithm is appropriate and accurate to be used in the case of selection of Regional Health Insurance receipts compared to manual calculations from the Kepatihan Village, Bojonegoro Regency. This can be seen from the results of the comparison percentage of 9% (SPPK) and 22% (Manual) with the condition of residents who are "able" and "receive" Regional Health Insurance. From this percentage, it can be concluded that the SPPK is more accurate than the manual. The results of the second percentage are 90% (SPPK) and 78% (Manual) with the condition of residents who "receive" Jamkesda and "cannot afford".

References

- Kusrini. (2007). Konsep dan Aplikasi Sistem Pendukung Keputusan. Yogyakarta: Andi
- Kusumadewi, Sri, Hartati, S., Harjoko, A., Wardoyo, R. (2006). Fuzzy Multi-Attribute Decision Making (FUZZY MADM). Yogyakarta: Graha Ilmu.
- Kusumadewi, S.; Hartati, S. (2010). Neuro-Fuzzy Integrasi Sistem Fuzzy & Jaringan Syaraf (edisi 2). Yogyakarta: Graha Ilmu
- Nainggolan S., Puncuna, dkk. 2011. Sistem Pendukung Pengambilan Keputusan Pemilihan Mata Kuliah Pilihan menggunakan Metode AHP.pdf. Bandung
- Saputra, Rahman. 2012. Sistem Pendukung Keputusan pemilihan jenis ikan untuk budidaya keramba di Aranio. Tersedia : http://www.academia.edu/3761663/SPK_Pemilihan_Jenis_Ikan_Aranio . (Diakses pada tanggal 5 Januari 2014)
- Sulistyo, Heri. 2010. Sistem Pendukung Keputusan untuk Menentukan Penerima Beasiswa Di SMA Negeri 6 Pandeglang.pdf. Tersedia : <http://elib.unikom.ac.id/files/disk1/438/jbptunikompp-gdl-herisulist-218921.cover.pdf>. (diakses tanggal 10/04/2013)
- Turban Efraim, Jay E. Aronson, Ting-Peng Liang. (2005). Decision Support Systems and Intelligent Systems. Yogyakarta: Andi.
- Wibowo S., Henri, dkk. 2009. Sistem Pendukung Keputusan untuk menentukan Penerimaan Beasiswa Bank BRI menggunakan FMADM .pdf. Yogyakarta.