

# DECISION SUPPORT SYSTEM TO DETERMINE QUALITY TRADITIONAL SPICE FOR MAKING TURMERIC ACID USING WEIGHT PRODUCT METHOD

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## Abstract

Determining quality spices is one example of decision-making issues based on many factors or semi-structured criteria. Decision support system is part of one of the computer-based information systems commonly used to support decision making on a company's activities to find a very good traditional spice. Decision support system of the selection of traditional spices qualified in making herbal turmeric acid can be produced by using several methods, one of them is the weighted product (WP) method. Weighted product is one method of solving the problem that uses multiplication to connect the attribute value, where the value of each attribute must be raised first with the weight of attribute concerned. By using this product weighted method, it is expected to help the research team to determine the selection of spices of very high quality. By using the decision support system and computerization, the quality of spice data can be stored therein, if there is an error in inputting the value or spice data herbal turmeric acid, then the wrong data can be repaired without re-input value or quality spice data.

*Keywords: weighted product, decision support system*

## 1.0 INTRODUCTION

### 1.1 Background of the Problems

Herbal medicine is a term for traditional medicine from Indonesia, especially javanese community. Herbal medicine is a herb derived from natural herbs without using chemicals as additives (additional ingredients). Herbal medicine is often referred to as a traditional herb because herbal medicine is already known since ancient times before the knowledge-related science of modern medicine into Indonesia. Turmeric herbal can heal pain at the time of menstruation, cure maag, and easy to make so public figure can make herbal turmeric acid.

The use of traditional medicines is recognized as a way to learn future potential medicines. In 2001, researchers identified 122 compounds used in the main treatment derived from "ethnomedical" plant sources 80% of them had had ethnomedical or identic use associated with current use of active plant elements.[1]

In the paper, Ingot Seen Sianturi (2013) using decision support system and database of student data or student majors can be stored therein, so that there can be errors in inputting values or student data then the wrong data can be repaired without having to re-input the value or student data. In the paper, Heru Supriyono, Chintya Purnama Sari (2015) from the test results and discussion can be concluded that the WP method has been successfully implemented in the selection of dwelling house based on the 11 factors used criteria.[2] In the journal Aziz Ahmadi, Dian Tri Wiyanti (2015) this method using the method (WP) because the calculation is simple and easy to apply in cases that still high element subjectivity.[3]

From several references that have been read that the same method research that is method of weight product (WP), and some also use Multi Attribute Decision Making (MADM) is a method used to find the optimal alternative of a number of optimal alternatives of certain criteria, using this weight product, it is hoped the process of determining the traditional spice of making herbal medicine turmeric more effective and efficient so it gets information according to the spice. With

the Weight Product (WP) method we can describe the problem and alleviate the problems faced by the community groups, and to know the thorough and accurate information on the research determining the traditional spices with the appropriate method of settlement, to increase the sales of the herbal turmeric tamarind. Based on that the author tries to make a web application so that people can find out what is spice in making herbal turmeric asem, and this application can make it easier for people to know what herbs spices are made, and can facilitate buyers or order anytime.

The benefits of this research can facilitate the decision making based on the need for determination of the determination of simplicia alternatives and the importance of determining the good method in determining the alternative, the authors propose with the method of Weight Product (WP) Simple Additive Wighting (SAW).

## 1.2 Formulation of The Problem

From the background description of the previous problem, it can be taken a problem formulation are:

1. How is the effectiveness and efficiency of decision making to determine the quality of traditional herb making turmeric acid herbal?
2. How to apply the weight product (WP) method in decision support systems to determine the traditional medicine production?

## 1.3 Benefits of The Research

From the formulation of the problem then the authors make the purpose and benefits of this study are:

1. Describe the assessment in the decision support system of making traditional spices quality herbal medicine or turmeric or traditional herbal medicine.
2. Applying the method of Weight Product (WP) and using a web to facilitate the consumer in obtaining information tentang sale or spice traditional herbal quality.
3. Time in determining the quality of traditional herbs for the manufacture of herbal turmeric acid.

## 2. THEORETICAL

### 2.1 Decision Support System

Decision making to determine the priority of regional superior products in accordance with the needs and capabilities required an accurate and effective decision so as not to choose and minimize losses both in terms of cost and time. Weighted Product method is part of the concept of Multi Atribute Decision Making (MADN) where required normalization on the calculation, because the agency simply select some items that will be an alternative selection and give weight value on the comparison of alternatives and criteria.[4]

Decisions have become commonplace in life. Due to problems and solutions. The definition of a decision is generally a choice that two or more possibilities. When it comes to the process, then the decision is the final state of a more dynamic process labelled decision making. Decision is seen as a process because it consists of a series of activities that are not merely considered as a wise act.

### 2.2 Decision Support System Characteristic

According to Erliza Septia Nagara, Rini Nurhayati (2015), characteristics in decision support systems, among others:

1. Decision Support System is designed to assist decision makers in solving semi-structured or unstructured problems by adding human wisdom and computerized information.
2. In the processing process, decision support systems combine the use of analytical models with conventional data entry techniques as well as information seeking / interrogation functions.
3. Decision Support System is designed in such a way that it can be used / operated easily.
4. Decision Support System is designed with emphasis on aspects of flexibility and adaptability are high. [5]

### 2.3 Decision Making System Process

According to Arif Hidayat, Muhamad Muslihudin, Indah Tri Utami, the decision-making process is divided into four phases:

1. Intelligence, the process of searching and detection of problematics and problem recognition process. The input data is obtained, processed, and tested in order to identify the problem.
2. Design, the process of discovering, developing, and analyzing alternative actions that can be done include the process to understand the problem, reduce the solution and test the feasibility of the solution.
3. Choice, which is the selection process among various alternative actions that may be implemented and then implemented in the decision making process. [6]

## 2.4 Fuzzy Multiple Attribute Decision Making (FMADM)

Raymond McLeod 1998 in the journal Ratih), Fuzzy Multiple Attribute Decision Making (FMADM) is a method used to find the optimal of a number of alternatives with certain criteria. The core of FMADM is to determine the weight value for each attribute, then proceed with the ranking process that will select the alternatives already given. Basically, there are three approaches to finding attribute weights, ie subjective approaches, objective approaches and an integration approach between subjective and objective. Each approach has its advantages and disadvantages. In the subjective approach, the weight value is determined on the basis of the subjectivity of the decision-makers, so that some factors in the alternative ranking process bias are determined freely. In the objective approach, the weighted value is calculated mathematically from the decision maker. There are several methods that can be used to solve the problem of FMADM namely:

- a. Simple Additive Weighting (SAW)
- b. Weighted Product (WP)
- c. ELECTRE
- d. TOPSIS (Technique for Order Preference by Similarity to Ideal Solution)
- e. Analytic Hierarchy Process (AHP). [4]

## 2.5 Weighted Product Method

According to Yoon (2006) Weight Product (WP) is one of the methods of completion in decision support systems, this method evaluates several alternatives to a set of attributes or criteria, whereby each attribute is independent of each other.[7]

According Sianturi Ingot Seen (2013) Weight Product method is one of the methods used to solve the problem. The Weight Product method uses multiplication to combine attribute values (criteria), whereas the value of each attribute must be raised first with the corresponding attribute weight (criterion).[8]

## 3. METHODOLOGY

### 3.1 Data Collecting Method

#### 3.1.1 Observation

That is make the directly understanding of quality traditional herb for making herbal turmeric acid for what is intended by the researcher to know the information.

#### 3.1.2 Interview

Conducting interviews and giving some questions to the speakers directly, to know the production process in making such turmeric herbal turmeric.

#### 3.1.3 Literature Study

That is by collecting from how many sources or from some references either in the form of scientific books, articles, related to what will be discussed in this research.

#### 3.1.4 Questionnaire

Questionnaire is a technique of data collection by asking written questions to be answered in writing by the respondent.

### 3.2 Weight Product Method

The Weighted Product (WP) method is one of the methods used to solve the problem. The Weighted Product (WP) method uses multiplication to associate attribute values (criteria), where the value of each attribute must be raised first with the corresponding attribute weight (criterion). The Weighted Product method requires a normalization process because this method passes the assessment result of each attribute. The multiplication result has not been meaningful if it has not

been compared (divided) with the standard value. Weights for benefit attributes serve as positive roles in the multiplication process, while the cost weight serves as a negative rank. [9]

The initial weights are fixed

$$W_j = \frac{W}{\sum w}$$

thus  $\sum W_j = 1$

$$S_i = \prod_{j=1}^n X_{ij} W_j$$

where:  $i = 1, 2, \dots, m$  and  $j = 1, 2, \dots, n$

$\Pi$  = product

$S_i$  = score from each alternatives

$X_{ij}$  = alternative value  $i^{\text{th}}$  to attribute  $j^{\text{th}}$

$w_j$  = weight from each attribute

Then proceed with the best alternative search with the following formula:

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

C<sub>1</sub>: Compliance with the provisions of the herbal spices

C<sub>2</sub>: Urgent for manufacture

C<sub>3</sub>: More beneficial to society

C<sub>4</sub>: Can be done community

C<sub>5</sub>: The success rate of development and sustainability

The weights and criteria set out in determining the traditional spice quality herbal preparation turmeric acid are:

**Table 1 : TABEL NILAI ALTERNATIF DAN KRITERIA**

Criteria	Note	Weight (%)
C <sub>1</sub>	Turmeric	20%
C <sub>2</sub>	Tamarind	10%
C <sub>3</sub>	Lime	20%
C <sub>4</sub>	Sugar	30%
C <sub>5</sub>	Water	20%

## 4. RESULTS

### 4.1 Manual Calculation on WP Method

#### 1. Alternative Quality Spices

The criteria for alternative quality herbs can be seen in table 1 below:

**Table 2 : Quality Spices Alternative Criteria**

Alternative	Criteria	Weight
	Lemongrass	20%

Quality Spices	Salt	10%
	Pandan leaves	20%
	Turmeric	30%
	Sugar	20%

On alternatives of Quality Spice Sere, Salt, Pandan Leaves, Turmeric, Sugar, obtained from the previous year.

## 2. Alternative Turmeric Acid

The criteria for alternative turmeric acid can be seen in table 3 below:

**Table 3 : Alternative Turmeric Acid Criteria**

Alternative	Criteria	Weight
Turmeric Acid	Wild Ginger	20%
	Tamarind	10%
	Lime	20%
	Sugar	30%
	Water	20%

In alternative turmeric acid, for the criterion points of wild ginger, tamarind, lime, sugar, and water, obtained from the current year.

**Table 4 : Early Weight of Each Criteria**

Criteria	Weight
C <sub>1</sub>	4
C <sub>2</sub>	2
C <sub>3</sub>	4
C <sub>4</sub>	6
C <sub>5</sub>	4

In the process of completion, the Weighted Product (WP) method uses several formulas. The formula used in determining scores / values for each alternative in the Weighted Product (WP) method is like the formula in chapter 3:

**Table 5 : Value of Any Alternative to Each Criterion**

Aternative	Criteria				
	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	C <sub>4</sub>	C <sub>5</sub>
Quality spices	70	80	65	85	5
Turmeric acid	70	85	65	90	10

Based on the table, it can be determined the best alternative using Weighted Product (WP) method. The completion step with Weighted Product (WP) method is as follows:

1. Determine the initial weight of each criterion.  
The initial weight of each criterion is  $w = (5, 5, 3, 3, 4)$ .
2. Fix weights in a way

$$W_j = \frac{W}{\sum w}$$

thus  $\sum w_j = 1$ .

The way of completion as follows:

$$W_1 = \frac{4}{4+2+4+6+4} = \frac{4}{20} = 0,2$$

$$W_2 = \frac{2}{4+2+4+6+4} = \frac{2}{20} = 0,1$$

$$W_3 = \frac{4}{4+2+4+6+4} = \frac{4}{20} = 0,2$$

$$W_4 = \frac{6}{4+2+4+6+4} = \frac{6}{20} = 0,3$$

$$W_5 = \frac{4}{4+2+4+6+4} = \frac{4}{20} = 0,2$$

3. In determining the best value using a positive value because there is no cost incurred. The way the solution is as:

$$W_{rb} = (70^{0,20})(85^{0,10})(65^{0,20})(90^{0,30})(10^{0,20}) = 51,382700$$

$$W_{ka} = (70^{0,20})(80^{0,10})(65^{0,20})(85^{0,30})(5^{0,20}) = 45,558171$$

4. Determine the best alternative value of each alternative.

The settlement value is as follows:

$$V_{rb} = \frac{51,382700}{96,940872} = 0,530042$$

$$V_{ka} = \frac{45,558171}{96,940872} = 0,469958$$

Based on the value of quality herbs and herbal turmeric, tamarind is the best value quality spices turmeric acid herbal.

## 5. Conclusion and Suggestion

### 5.1 Conclusion

Based on the research that has been done, it can be concluded as follows:

1. Existing decision-making systems can facilitate the researcher to determine the qualified spice to speed up the selection process by inputting the values and getting the results directly, compared to previously determining the selection of quality herbs still manually.
2. By using decision support system and computerization, value and data of quality spices turmeric acid can be stored therein, resulting in mistakes in input value or quality spice data, then the wrong data can be fixed.

### 5.2 Suggestion

Based on the conclusions, then the expected suggestion are:

1. Decision support system to determine the traditional herb-quality can be developed by the specific development needs of system users who must be met in reaching higher stages and better system performance and optimal.

2. Decision support system built in accordance by the chosen method to determine the quality herb can be compared with other methods such as SAW, AHP and TOPSIS.

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