Application Culinary Decision Support System in Kudus City with Weighted Product Method Based on Mobile Phone

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ABSTRACT

Along with the number of restaurants located in the city of Kudus, making a problem for a consumer or tourists who want to choose a restaurant. This can even take a lot of time because consumers are faced with the many choices of restaurants. Therefore, a decision support system is needed to assist consumers or tourists in choosing a culinary place. In determining the selection of culinary places in the city of Kudus, using the Weighted Product method to determine the culinary place with several criteria: the number of menus, the average price, wifi, and corner charger. The culinary site selection system with weighted product method is implemented in the mobile phone-based system. The mobile phone application is made to facilitate the admin and user choose culinary or restaurant with the process used in determining the culinary place in the city of Kudus by using criteria inputted by the user. This app is also in add google maps, so direct users can knowing location culinary location or restaurant that has become his choice.

ABSTRAK

Seiring dengan banyaknya restoran yang berlokasi di kota Kudus, membuat masalah bagi konsumen atau wisatawan yang ingin memilih restoran. Ini bahkan dapat mengambil banyak waktu karena konsumen dihadapkan pada banyak pilihan restoran. Oleh karena itu, diperlukan sistem pendukung keputusan untuk membantu konsumen atau wisatawan dalam memilih tempat kuliner. Dalam menentukan pemilihan tempat kuliner di kota Kudus, menggunakan metode Weighted Product untuk menentukan tempat kuliner dengan beberapa kriteria: jumlah menu, harga rata-rata, wifi, dan tempat charger. Sistem pemilihan lokasi kuliner dengan metode weighted product diimplementasikan dalam sistem berbasis ponsel. Aplikasi ponsel dibuat untuk memudahkan admin dan pengguna memilih kuliner atau restoran dengan proses yang digunakan dalam menentukan tempat kuliner di kota Kudus dengan menggunakan kriteria yang dimasukkan oleh pengguna. Aplikasi ini juga di tambahkan google maps, sehingga pengguna langsung bisa mengetahui lokasi lokasi kuliner atau restoran yang sudah menjadi pilihannya.

1. Introduction

Kudus Regency is a kretek city. In addition to the city of Kretek, Kudus also has many beautiful views. This tourist attraction is usually synonymous with typical food. Special foods are foods that have characteristics that are not found in other areas. The diversity of special foods in the area makes many local tourists and foreign tourists to enjoy culinary tourism [1]. Along with the development of the restaurant business, he also developed consumer buying behaviour. Changes in consumer purchasing patterns that from the beginning are not very important and the benchmark makes only the prices while other factors can be ignored, now a new character emerges from consumers who become very selective and critical in determining purchases. Options are not only in terms of price. Several factors determine consumer choices, including the menu of the number of conditions, the average price, and the facilities consumers will get from a restaurant [2]. Therefore we need a decision support system that is used to make decisions in the selection of culinary locations. Support System (DSS) is a support system to support management decision making [3][4].

Decision support system (DSS) is part of a knowledge-based information system computer-based system or knowledge management that is used to support decision making in an organisation or

company. Based on the above understanding obtained information about DSS is not a tool for making decisions, which is a system that helps decision making by supplementing information with data that has been obtained with relevant and necessary to decide on a problem more quickly and accurately. So this system does not agree to make decisions in the decision making process[5][6]. One alternative solution to get the optimal solution is to use a decision-making method called fuzzy multi-attribute decision making (FMADM). Multi-attribute decision making is used to determine the best alternative of alternative considerations based on certain predetermined criteria One method in FMADM that is quite well known is the weighted product (WP) method. WP method is widely used to make decisions because of the simple method of all factors and fast calculation. The weighted product method is known to be more thorough because the weighted product method obtains a doubling in the valuation value and the weighted value results in ranking order. This makes ranking information more precise with specific results and has a faster average execution time [8][9][10]. Support System (DSS) is a support system to support management decision making. Decision support system (DSS) is part of a computer-based knowledge-based information system or management knowledge that is used to support decision making in an organisation or company. Based on the above understanding obtained information about DSS is not a tool for making decisions, which is a system that helps decision making by supplementing information with data that has been obtained with relevant and necessary to decide on a problem more quickly and accurately. So this system does not agree to make decisions in the decision making process.

2. Method

2.1. Weighted Product Method

Weighted Product method requires the normalisation process due to this method. Submit the results of each assessment attribute. The multiplication result has not meaningful if not compared (shared) with a standard value. Weight for the benefits attribute serves as a positive rank in the multiplication process, while cost weight works as a negative rank. Weighted Product Method using multiplication as a connect attribute rating, where each attribute rating must be raised first with the weights concerned. The weighted product method can help in making decisions but the calculation with using the weighted product method only yields the greatest value which will be selected as an alternative the best. Calculations will be appropriate with this method if alternative the elected meets the criteria has been determined. The weighted method this product is more efficient because of the time which is required in the calculation shorter[11][12]. Preferences for alternative Si are given as follows formula 1:

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

With i = 1,2 ..., m; where Σ Wj = 1 Wj (2) is rank positive for attribute profit and negative value for cost attributes.

$$W_j = \frac{Wi}{\Sigma Wj} \tag{2}$$

The relative preferences of each alternative, given as follows formula 3:

$$V_i = \frac{\prod_{j=1}^{n} X_{ij}^{W_j}}{\prod_{j=1}^{n} X_{j*}^{W_j}} \; ; with \; i = 1,2,\dots,m. \tag{3}$$

As for the criteria is divided into two categories that are for value positive are included in the criteria profit and negative value included in the cost criteria. Information[13][14] :

A : Alternative
C : Criteria
W : Weight
S : Preferences for alternatives
V : The value of the vector used for ranking

 X   : The alternate value of each criterion
.

2.2. Research Method

The types of data used in this study are:
1. Primary data, is data obtained from the research object, as follows: List of restaurants, number of menus, average prices and facilities.
2. Secondary data is data obtained from literature, reference books, and internet browsing.

Methods of data collection conducted in this research are:
1. Observation: data collection through observation and direct interviews with consumers.
2. Library Studies: collecting research supporting literature, either from reference books or browsing from the internet.
Research data used for research is data contained in Kudus as much as 73 data.

3. Results and Discussion

3.1. Use Case Diagram

According to [1], use case Diagram describes how users interact with the system by determining the necessary steps. Use Case diagram in this study are as follows:
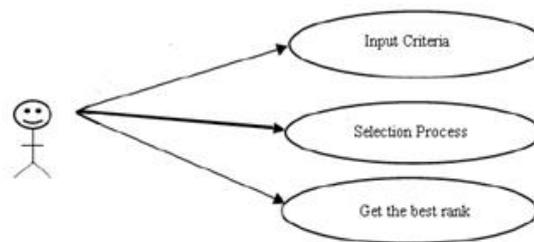

Figure 1 Use Case Diagram

3.2. Weighted Product Method Calculation

Headings The decision-making system of restaurant selection using the weighted product method is realized in the android based system. Weighted Product method is one of the MADM problem-solving methods (Multi-Attribute Decision Making). This method evaluates several alternatives from a set of attributes or criteria, in which each attribute is independent of each other. The Weighted Product method uses the multiplication technique for the attribute of the rating attribute, where the rating of each attribute must be raised first with the weight of the attribute in question. This process is similar to the normalisation process. Samples from restaurant data along with the criteria of each alternative restaurant and manual calculation process will be presented in table 1 below.

Table 1 Data Sample

Alternative	Name of restaurant	CRITERIA				
		C1	C2	C3	C4	C5
R1	Bale Raos	42	55.000	0	0	1.232
R2	Green Bakery & Bistro	50	75.000	1	1	1.543
R3	Kopi Kritink Premium	63	42.000	1	1	2.012

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Criteria used as a reference in the selection of restaurants there are 5, namely:
C_1: Menu Variation (number of menus)
C_2: Average price
C_3: Wifi
C_4: Charger Corner
C_5: Distance

C_1 criteria (quantity of food), C_3 (Wifi) and C_4 (Charger Corner) are beneficial (if the value is increasingly favored). While the criterion C_2 (food price), C_5 (restaurant distance) is the cost /cost criterion (The greater the value will get worse)

Stage 1
Two categories that distinguish the above criteria-among others. Description of weights:
5 = very important,
4 = important,
3 = quite important,
2 = not so important,
1 = not important

Table 2 Weight of Categories

	CRITERIA			
C_1	C_2	C_3	C_4	C_5
5	3	4	4	2

Stage 2
From the table 2, preference weights of W = (5, 3, 4, 4, 2). Wj is W index to j. So for the improvement of W_1 weight becomes:

$W_1 = \dfrac{5}{5+3+4+4+2} = 0,28$

$W_2 = \dfrac{3}{5+3+4+4+2} = 0,17$

$W_3 = \dfrac{4}{5+3+4+4+2} = 0,22$

$W_4 = \dfrac{4}{5+3+4+4+2} = 0,22$

$W_5 = \dfrac{2}{5+3+4+4+2} = 0,11$

Stage 3
Determining the Vector Value S, so results from calculating S_i are as follows:
$S_1 = (42^{0,28})(55.000^{-0,17})(0^{0,22})(0^{0,22})(1.232^{-0,11}) = 0$
$S_2 = (50^{0,28})(75.000^{-0,17})(1^{0,22})(1^{0,22})(1.543^{-0,11}) = 0,1978021$
$S_3 = (63^{0,28})(42.000^{-0,17})(1^{0,22})(1^{0,22})(2.012^{-0,11}) = 0,2261850$

Stage 4
Determining the value of the vector to be used Calculating Preferences (Vi) for friction. So Results from Calculating Preferences (Vi) are as follows:

$V_1 = \dfrac{0}{0+0,1979294+0,2261850} = 0$

$V_2 = \dfrac{0,197924}{0+0,1979294+0,2261850} = 0,4666887047$

$V_3 = \dfrac{0,2261850}{0+0,1979294+0,2261850} = 0,5333112953$

From the above calculation, Value V3 shows the greatest value so that in other words V3 is the best

choice, Kritink Premium Coffee deserves to be the best restaurant choice according to the weighting given by the decision-maker.

3.3. Implementation for Application

Implementation of app display android decision support system for selection location culinary as information using weighted product method. First, This page displays the main page of Kudus Culinary

Figure 2 Display Main Menu

After the display menu, this page includes data to be searched according to the criteria desired by consumers such as the number of menus, average price, wifi, charger corner, and distance.

Figure 3 User input criteria

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And the last, this page shows the culinary menu recommendations from the calculation criteria by using the weighted Product method

Figure 4 Results of Weighted Product Method Activity

4. Conclusion

The decision support system of culinary selection by using the method of the weighted product. The weighted product method can generate some recommendations according to the parameters inputted by the user. This system is expected to facilitate consumers in finding a restaurant. Implementation Decision Support System Selection Culinary Place by Using the based on mobile phone weighted product method developed using Android Studio.

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