

Constructing a Culinary Tourism Recommendation System Based in Palembang, Indonesian Using Weighted Product Method



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ABSTRACT: Based on the survey that conducted on 33 respondents from the Palembang peoples and non-Palembang peoples, got the result that state, most respondents state they had trouble to deciding which restaurant to go to when visiting Palembang and most respondents need 20 to 60 minutes to determine which restaurant that they want to order the food in Palembang area. Therefore, this study will construct a restaurant recommendation system based on the Palembang region and implementing the Weighted Product method and also adding window maps features. This study aims to assist Palembang and non-Palembang users to choosing system-recommended restaurants in Palembang. The result of this study shows that the recommendation system has successful outcomes in helping the users with great overall feedback showing a high satisfaction level of 89.93%.

KEYWORDS: Filter, Palembang, Recommendation system, Weighted Product.

I. INTRODUCTION

The Indonesian nation is a nation that has a lot of diversity. both in terms of customs, culture, religion, ethnicity, and language so that the state of Indonesia is a country rich in natural resources, one of the wealth In the culinary arts, there are various types and uniqueness that are different in each the area in it, ranging from street food, cafes, and even restaurants traditional methods that have different processing and presentation methods in every area [1]. One of the areas that are in the spotlight related to culinary is culinary delights that come from the area of South Sumatra, one of which is pumped which characterizes typical food that mushroomed in the capital and remote areas of the country [2]. One of the main destinations for culinary tourism in the South Sumatra area in Palembang, as evidenced by several large events such as the Sea Games in 2011 and the Asian Games in 2018. Palembang has a rich history strong and is one of the oldest cities in Indonesia and is reflected in the many historical culinary delights in Palembang such as pempek, tekwan, pindang, martabak har, and celor noodles [3].

The current phenomenon is the number of people who become food vloggers to visit the many places to eat in every area in Indonesia as well as many restaurants that endorse influencers to promote hidden and little-known foods to many people [4]. This happens because many people are confused about determining the food they want to consume or the location of the culinary tour that they want to eat want to be tasted, especially newcomers who come to the area [5]. In choosing a restaurant according to your wishes, you tend to spend more time, even more so, the variety of people's tastes have different points of view on culinary to find a restaurant as desired [6]. With these problems, a consumer will feel confused and have doubts about choosing a restaurant appropriate and on the tastes of these consumers, each consumer has different tastes and levels of satisfaction [7], [8]. Consumer satisfaction is the level of consumer feeling after comparing what he accepts and hopes. This sense of satisfaction is the goal of consumers in consuming food so that if consumers do not get it according to their tastes, consumers tend to be dissatisfied or even disappointed with the food in consumption.

According to a survey that has been conducted on 33 respondents, whether people from Palembang, not Palembang people, nor people who had visited Palembang, from the result survey, it can be conclude that there are still many people who are still confused in choosing a restaurant and it takes a long time to choose a restaurant. The average time needed to vote for the restaurant is about 20 minutes to 1 hour and that time is classified as long. So that most of the people who have been observed feel that it is important to create a food recommendation system so that it can help people in thinking and look for a restaurant to be faster [9]. So that it can be implemented into a restaurant choice recommendation system to help consumers choose based on what they want. Criteria used are taken based on observations of 33 respondents to determine what criteria are used when you want to choose a house eat. The results of the criteria consisting of price, rating, location, and operating hours obtained from

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a survey of 33 respondents, the results of the observations are in the attachment. The uniqueness of this research is the existence of window maps that directly shows the location of the restaurant.

The solution that can be applied is a recommendation system choice for culinary tourism, this system uses the Weighted Product method because it has a more detailed calculation due to alternative calculations the best is obtained by multiplying the value of the performance rating and then raising it to a rank with the weight value that has been fixed. The purpose of this research is to design and build a culinary recommendation system for the Palembang area with the Weighted Product method and measure the level of user acceptance of the application that has been made with the End User Computing Satisfaction (EUCS) method.

II. STUDY LITERATURE

This section will explain the research methodology that is used in this research, the algorithms that will be used, study literature, and will also explain the system design that is chosen to fulfil the research objectives. Recommendations are a way to help people with a lack of knowledge to make some decisions that can be trusted. And a recommendation system is a system that can be used to inform and convince the user to make choices against period. The decision support system with the Weighted Product Method is a computerized program used for assessment, determination, and actions taken by a business using multiple attributes decision making [10]. There are alternative decisions to be taken as well as criteria for alternative decisions or attributes to determine the best choice [11], this decision-making technique is done by selecting attributes, goals, and objectives for different purposes [12]. This is where these different attributes, goals, and objectives are considered to be a criterion, the criteria include size, rules, and standards that will guide the process of making a decision [13].

The Decision Support System itself is composed of three related components, a language system (a mechanism for providing communication between users and other Decision Support System components) [14], a knowledge system (a repository of knowledge about problems contained in a Decision Support System or as a data or a procedure) and a problem processing system (a relationship between two other components, consisting of one or more capabilities in manipulating general problems needed in making a decision) [15]. The decision support system collects data to be analyzed so as that produce comprehensive reports. DSS is also a system that interactive and computer-based tools that assist users in assessing and making decisions about something and building a model and running the program also calls the source of information for making a decision [16]. The decision support system collects data to be analyzed so as that produce comprehensive reports. DSS is also a system that interactive and computer-based tools that assist users in assessing and making decisions about something and building a model and running the program also calls the source of information for making a decision there are several formulas used in the Weighted Product, namely:

The formula for calculating the weights to obtain the weights:

$$W_j = \frac{w_j}{\sum_{j=1}^n w_j} \quad (1)$$

Formula vector Si:

$$S_i = \prod_{j=1}^n X_{ij}^{W_j} \quad (2)$$

Formula vector V:

$$v_i = \frac{S_i}{S_1+S_2+S_3+\dots+S_n} \text{ dengan } i = 1, 2, 3, \dots, n \quad v_i = \frac{S_i}{S_1+S_2+S_3+\dots+S_n} \quad (3)$$

End-User Computing Satisfaction (EUCS) is a method for measuring the level of satisfaction of users of an application system by comparing expectations and the reality of an information system-User Computing Satisfaction was first coined by Torkzaadeh and Doll. The definition of End User Computing Satisfaction from an information system is the overall evaluation of users of information systems based on their experience in using the system.

Evaluation using the model in Fig 1 emphasizes end-user satisfaction with the technology aspect, by assessing content, accuracy, format, timing, and ease of use of the system. This model has been tested by many other researchers to test its reliability [10]. In this study, the Likert scale was used as a guide for interpretation. Scale Likert is a research scale used to measure attitudes and opinions. This scale is used to complete a questionnaire that requires respondents to indicate the level of agreement on a series of questions. Level The agreement in question is a Likert scale of 1-5 choices, with a gradation of Strongly Agree (SS) to Strongly Disagree (STS).

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III. METHODOLOGY

The system design stage is carried out by designing the flowchart, database system and mockup system that will be used when creating the recommendation system, as well as what features can be done by the recommendation system so that this stage is the beginning to make the system so that the system made becomes clearer and more focused. A flowchart shows the flow or flow and the relationship between the processes of a program logically and procedurally. The main flowchart that shown culinary tourism recommendation system process can be seen at Figure 1 and Figure 2.

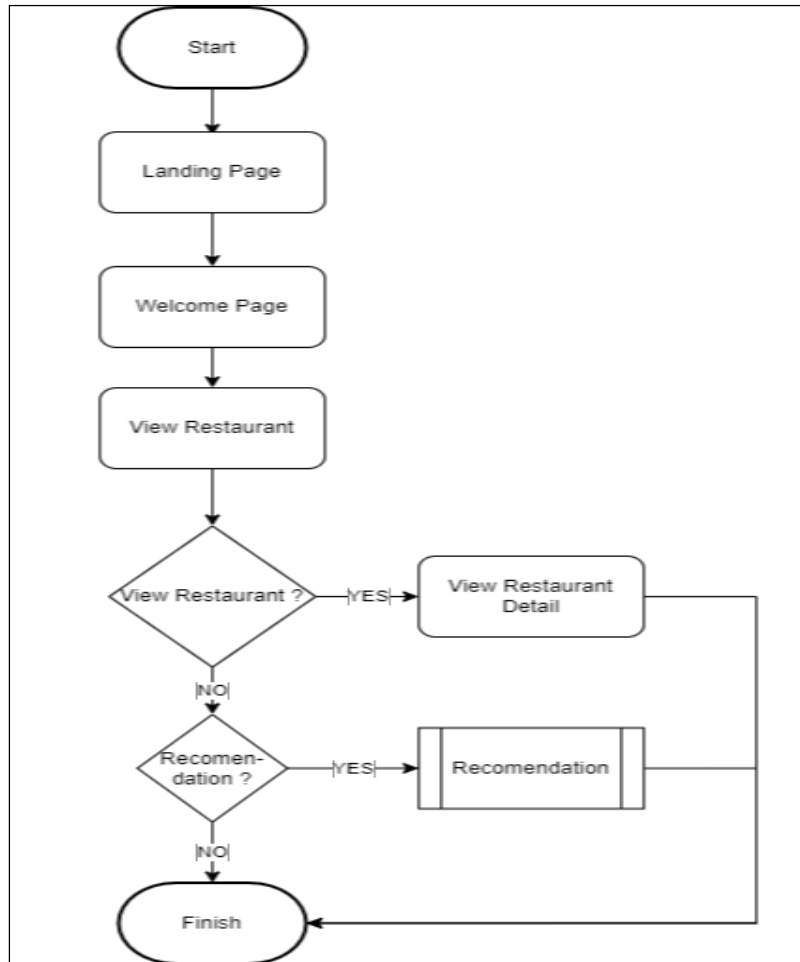


Fig. 1. Flowchart Website Payo Makan Recommendation System

Figure 1 is a flowchart of the existing recommendation system on the user side, it can be seen that the user will be redirected to the landing page and then will enter into the welcome page, after that it will go directly to the main page namely the restaurant page and can choose several other pages such as restaurant detail page and recommendation which contains the calculation process.

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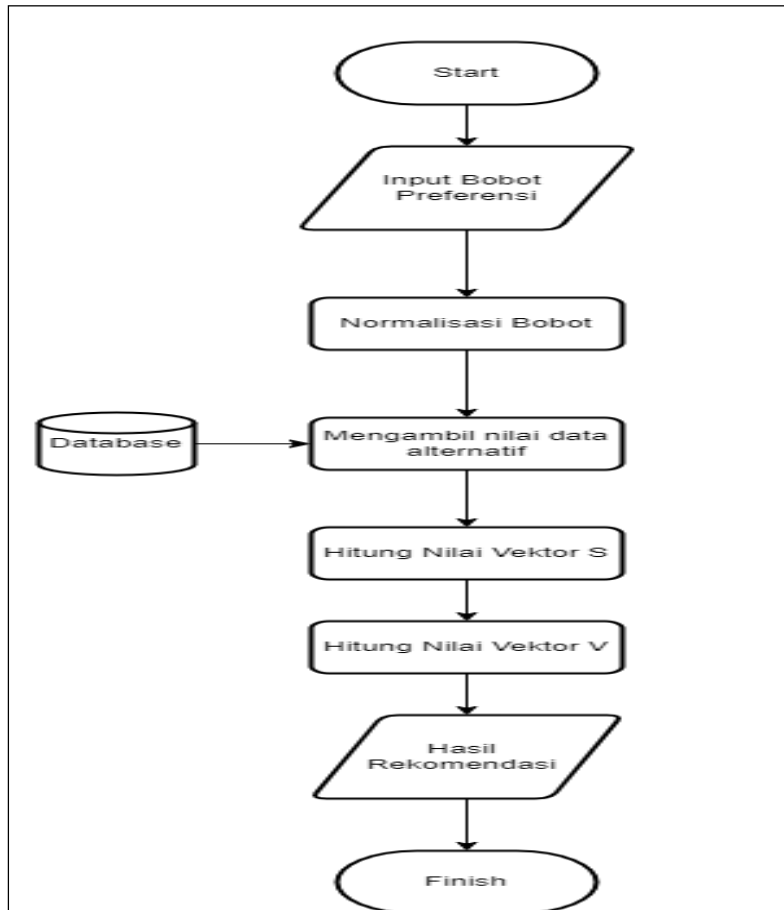


Fig. 2. Weighted product flowchart process

Figure 2 shown flowchart of the recommendation calculation process, first, the system will get the preference weight from the user input then the weight obtained will be normalized after that take alternative data for each criterion after that calculate the value of S and V then the results of the recommendations that have been calculated with the formula will appear.

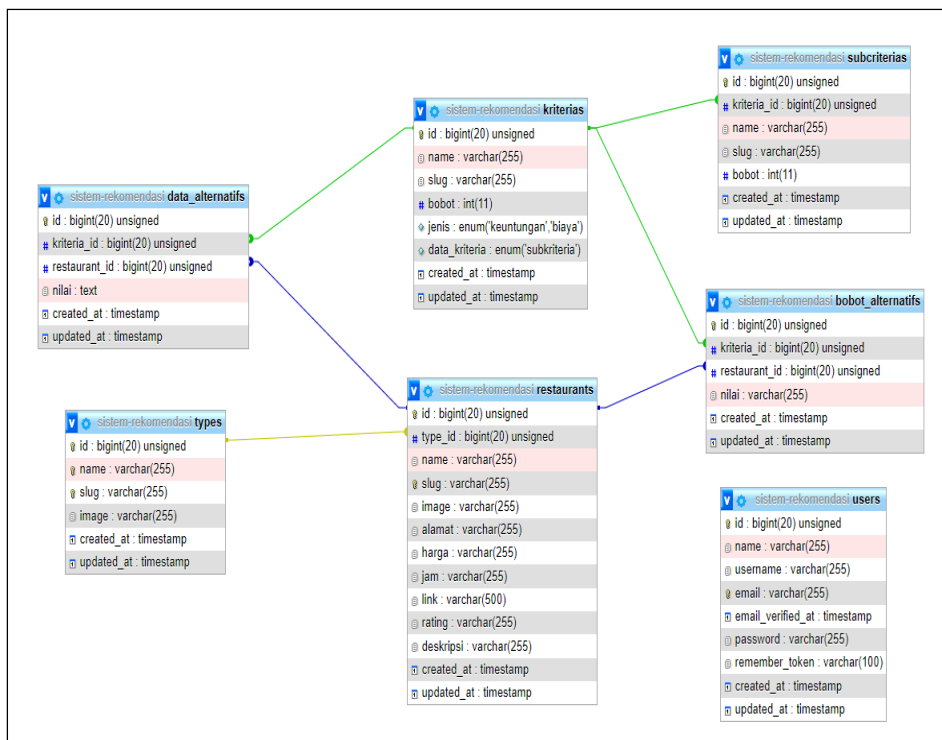


Fig. 3. Entity Relation Diagram Payo Makan recommendation System

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Figure 3 shown a relation between tables in database for system “Payo Makan” recommendation system, there are seven data tables used in building the “Payo Makan” website, and there are six tables that have a relationship between tables including alternative data tables with criteria having one relationship to many, where one criterion has many alternative data, then the table alternative data with the restaurant’s table has a one to many relationships where one restaurant has a lot of alternative data, then the criteria table with sub-criteria have a one to many relationships where one criterion has many sub-criteria, then the criteria table and alternative weights have a one-to-many relationship that where one criterion has many alternative weights and the restaurant table with The alternative weights have a one-to-many relationship where one restaurant has many alternative weights, then for table type with table restaurants have a one-to-many relationship where the type is owned by many restaurants, while for user table stands alone and has no relation with other tables.

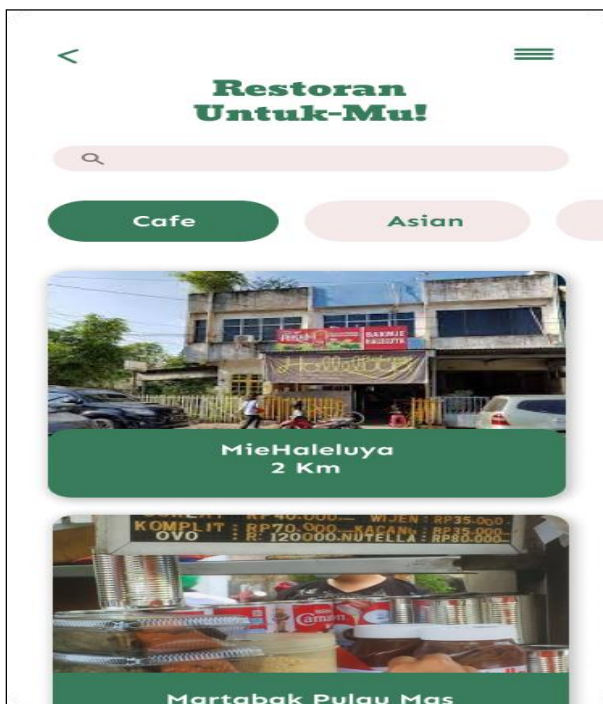


Fig. 4. Main page mock-up

Figure 4 shown the initial design of the main page, this page consists of one navbar containing navigation to another page, a search box that allows users to search for specific restaurants by keywords, a category slider that contains a list of categories, as well as a list of restaurants that there is.



Fig. 5. Recommendation page muck-up

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Figure 5 is the initial design of the recommendation page, this page contains a form consisting of four existing criteria consisting of price, location, distance, and hours of operation. Each criterion has a select value that consists of options that will determine the initial weight to be used in the calculation to produce a sequence of restaurant recommendations according to the method used.

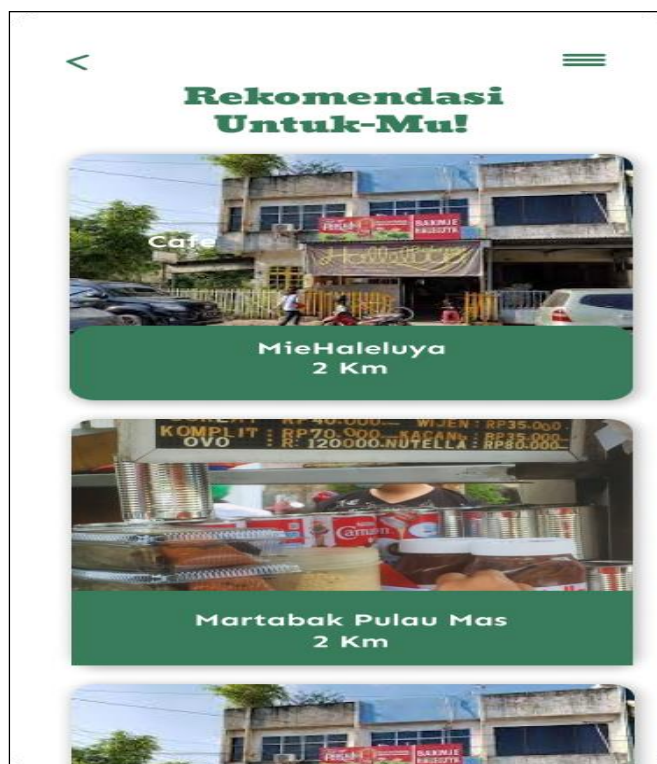


Fig. 6. Recommendation result page mock-up

Figure 6 shown the initial design of the recommendation results page. This pages contains a list of restaurants that have gone through the calculation process and are sorted from the best according to the calculation results

IV. IMPLEMENTATION

Implementation is done using the Laravel framework using the PHP programming language, here is a snippet of the implementation results and the code used in this system. Mockup that shown in Figure4 implemented into system recommendation, where in the main page containing the navbar, category list, and list of existing restaurants. In the navbar, several options can be directed to the page that is home, restaurant, and recommendations. Under The navbar has a search column that is useful for finding restaurants with certain keywords, after that there is a choice of sliders from each existing category, then below it, there is a list of restaurants which are divided into 10 per page.

Mockup that shown in Figure5 implemented into system, where in this page user can selects a recommendation. On this page, there is a form consisting of four existing criteria, namely price, rating, location, and hours of operation. In each criterion, the user can determine weights by selecting the options in the form of very unimportant, unimportant, mediocre, important, and very important that will determine the results of the recommendations obtained. Mockup that shown in Figure6 implemented into recommendation system, where on this page, the results of the culinary recommendation system that using weighted product will be displayed based on the category choices the user has selected on the previous page.

After implemented Weighted Product method in recommendation system and a web application with the following specifications. Table 1 to Table 4 shown the calculation steps performed using the Weighted Product method. The calculation is done by normalizing the weight of the criteria that have been determined and then it will be raised to the power of each restaurant data from each of the known criteria as vector s then each vector s result will be divided by the total vector s which becomes vector v and sorted from the largest value.

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Table I. Restaurant Data

| Restaurant | Criteria | | | |
|---------------|----------|-----|-----|------|
| Name | C1 | C2 | C3 | C4 |
| RM Nusantara | 51.140 | 4.7 | 2.9 | 12.5 |
| Bakmi Alun | 41.900 | 4.7 | 3 | 14 |
| Kopitiam | 54.858 | 4.7 | 4.3 | 13.5 |
| Sarinande | 42.440 | 4.6 | 3.1 | 11 |
| Kampung Kecil | 44.000 | 4.6 | 4.8 | 12 |

Before performing calculations, the first step that must be done is to determine the initial weight which will be determined by the user as a determinant of the final calculation result. For this trial calculation, the weight of each criterion will be used as shown in Table 1.

Table II. Criteria Weight

| No | Name | Score |
|----|----------|-------|
| C1 | Price | 3 |
| C2 | Rating | 5 |
| C3 | Location | 3 |
| C4 | Time | 3 |

After determining the weight of each criterion, a normalization process will be carried out from the weights obtained by dividing each weight by the total weight of each criterion as shown in Table 2.

Table III. Criteria Normalization

| No | W | Result |
|----|---------------|--------|
| C1 | $3/(3+5+3+3)$ | -0.214 |
| C2 | $5/(3+5+3+3)$ | 0.357 |
| C3 | $3/(3+5+3+3)$ | -0.214 |
| C4 | $3/(3+5+3+3)$ | 0.214 |

Table 3 is a determination for the weight of the criteria that is cost will be multiplied by -1 while for the profit it will be multiplied by 1 so that the weight of price and location is multiplied by -1.

Table IV. Vector S calculation for each data

| No | Calculation | Result |
|----|---|--------|
| S1 | $(51140^{-0.214})(4.7^{0.357})(2.9^{-0.214})(12.5^{0.214})$ | 0.233 |
| S2 | $(41900^{-0.214})(4.7^{0.357})(3^{-0.214})(14^{0.214})$ | 0.247 |
| S3 | $(54858^{-0.214})(4.7^{0.357})(4.3^{-0.214})(13.5^{0.214})$ | 0.214 |
| S4 | $(42440^{-0.214})(4.6^{0.357})(3.1^{-0.214})(11^{0.214})$ | 0.231 |
| S5 | $(44000^{-0.214})(4.6^{0.357})(4.8^{-0.214})(12^{0.214})$ | 0.212 |

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Table 4 is the process of calculating vector s by multiplying each alternative data for each criterion and each alternative data to be multiplied will be raised first with the normalized value of the criterion weight.

Table V. Vector V calculation for each data

| No | Name | Score |
|----|--------------|-------|
| V1 | 0.2333/1.137 | 0.205 |
| V2 | 0.247/1.137 | 0.217 |
| V3 | 0.214/1.137 | 0.188 |
| V4 | 0.231/1.137 | 0.203 |
| V5 | 0.212/1.137 | 0.187 |

Table 5 is a process for calculating vector v by dividing each vector s by the total number of vectors available.

Table VI. Ranking of the results of the vector v

| No | Name | Score |
|----|---------------|-------|
| V2 | Bakmi Alun | 0.217 |
| V1 | RM Nusantara | 0.205 |
| V4 | Sarinande | 0.203 |
| V3 | Kopitiam | 0.188 |
| V5 | Kampung Kecil | 0.187 |

Table 6 is the final result of the vector v calculation sorted from the largest to the smallest results.

V. EVALUATION AND RESULT

User acceptance of this recommendation system has been successfully obtained, user satisfaction is measured by distributing questionnaires form to get feedback from users. 40 user respondents have answered the survey, the survey is carried out using the End User Computing Satisfaction (EUCS) method. The user satisfaction test has five aspects that are used as measurement indicators, namely content, accuracy, format, ease of use, and timeliness. So that the questions that will be made are based on these five aspects, the following is a list of questions that will be distributed based on the EUCS concept. The following is the list of question that grouping by category.

1. Content

- The information content of the Payo Makan website provides information according to your needs?
- The content of the Payo Makan website information is easy to understand?
- Is the information on the Payo Makan website complete enough?
- The content of the Payo Makan website information is very clear?

2. Accuracy

- The Payo Makan Recommendation System has produced true and accurate information?
- Each link in the Payo Makan recommendation system already displays the appropriate page?

3. Format

- The display design of the Payo Makan recommendation system has an attractive color setting?
- The display design of the Payo Makan recommendation system has a layout that makes it easy for users?
- The display design of the Payo Makan recommendation system has a menu structure and links that are easy to understand?

4. Ease of Use

- Is the Payo Makan website very easy to use?
- Is the Payo Makan website easy to access from anywhere and anytime?

5. Punctuality

- Information about the restaurant you need quickly obtained through the Payo Makan recommendation system?
- Payo Makan's Web recommendation system displays up-to-date information?

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A total of 40 respondents have used the system and answered the survey. After the survey results are obtained, the results can be calculated using the Likert scale formula to get the percentage score for this recommendation system, Table VII shown the results of calculating the percentage score.

Table VII. Skor hasil survey aspek konten

| Content Aspect | | | | | |
|----------------|--------|----|----|----|----|
| Question | Answer | | | | |
| No | STS | TS | N | S | SS |
| 1 | 0 | 0 | 2 | 11 | 27 |
| 2 | 0 | 0 | 3 | 9 | 28 |
| 3 | 0 | 0 | 3 | 21 | 16 |
| 4 | 0 | 0 | 3 | 15 | 22 |
| Score Total | 0 | 0 | 11 | 54 | 93 |

The following is calculation for content aspect based on Table VII, where the score total will calculate based on weight, where weight of SS is 5, weight of S is 4, weight of N is 3, weight of TS is 2 and weight of STS is 1. From that weighted, will get the final score result is 714. Percentage of content aspect will be divide by highest score and calculate by percentage, and from the calculation, will get 89.25% result. Based on the survey results for the content section there are 4 representative questions, as many as 93 answered strongly agree, 54 answered agree, 11 answered neutral, 0 answered disagreed, 0 answered strongly disagree. So that after the calculation, the results obtained as much as 89.25% which indicates that the respondents agree that the Payo Makan recommendation system has fulfilled the content aspect. And for results satisfaction that has been calculated obtained is 89.93% which is categorized as very good.

VI. CONCLUSION

The restaurant recommendation system in Palembang using the Weighted Product method has been successfully designed and created, the system recommendations for calculating according to the stages of the Weighted Product method by taking the user preference weight value. The finished system Experiments have also been carried out by comparing the results of calculations system with manual calculation results, the results obtained have matched well manual or in the system so that it can be concluded the system that has been built has been successful and as expected. For future research, there is several additional suggestions are provided as follows: First, the UI/UX appearance of the system can be improved and made more colourful so that the display becomes even more attractive and nice. And restaurant data should be added, so that there is a lot choices and variety. And the last should be added several features such as a food review column, the best menu on the website for each restaurant to make this culinary recommendation system more interesting and varied.

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