**ISSN** 2409-2665
**Journal of Logistics, Informatics and Service Science**
Vol. 11 (2024) No. 11, pp. 519-534
**DOI:10.33168/JLISS.2024.1128**

# Developing a Multi-Criteria Restaurant Recommendation System with MOORA: A Case Study in Gading Serpong

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**Abstract.** The rapid growth of the restaurant industry in Indonesia, particularly in the Gading Serpong area, has led to an increasing variety of dining options. This abundance of choices can often lead to confusion among consumers when selecting a restaurant. To address this issue, this study aims to develop a web-based restaurant recommendation system using the Multi-Objective Optimization by Ratio Analysis (MOORA) method. The system assists users in making informed decisions by providing restaurant recommendations based on their preferences. The MOORA method is employed to rank restaurants considering multiple criteria such as price, operating hours, cleanliness, food variety, and ratings. The system's effectiveness is evaluated using the End-user Computing Satisfaction (EUCS) method, which assesses user satisfaction across five dimensions: content, accuracy, format, ease of use, and timeliness. The results indicate that the developed system achieves an overall user satisfaction rate of 87.53%, demonstrating its potential to assist users in restaurant selection. This research contributes to the application of multi-criteria decision-making methods in recommendation systems and highlights the importance of user satisfaction evaluation in system development.

**Keywords:** End-user Computing Satisfaction, Moora, Recomendation Systems, Restaurant, Website.

# 1. Introduction

The rapid development in the culinary field can be seen from the increasing variety of available restaurants. This can be observed through the numerous types of restaurants circulating today. It is a result of the growing number of people who need diverse restaurant options to facilitate their daily lives (Chua et al., 2020). One area that has experienced a growth in restaurant variety is Gading Serpong. Gading Serpong is a self-sufficient city located in the Kelapa Dua District, Tangerang Regency, known for its comprehensive city facilities (Frascani et al., 2020). Over time, Gading Serpong has continued to develop, including an increase in restaurant variety (Carmelia et al., 2021).

With the growing number of restaurants, people have a multitude of options and may become confused when choosing a restaurant to visit. Visiting new restaurant that has good taste and suit the needs of person can be difficult (Mahajan et al., 2021). According to a survey conducted on February 17, 2023, 90% of the respondents experienced difficulties in determining their restaurant choice. This result was obtained from a survey that included questions about restaurant decision-making.

Choosing better restaurant is challenging. As technological advancements, technology can be used to obtain information about a restaurant and to determine evaluations of a restaurant. With the development of technology as a source of information, a system is needed to handle the abundance of available information.

Rapid technological advancements have greatly assisted various fields in their implementation (Chua et al., 2020). Previous research has shown that technological advancements have also improved various areas (Dabbagh & Yousefi, 2019), one of which is as a source of information. In its utilization, technology is used to search for information. Technological advancements go hand in hand with the development of information sources (Mariah & Nurbaiti, 2019).

To overcome the challenge of choosing restaurants, users can explore the availability and information of a certain product using recommendation system. A recommendation system is a (web) personalization tool that provides users with a list of items that are suitable to their preferences. The recommendation system infers user preferences by analyzing user data and information about the user and their environment. Recommendation system might save time and money. It also should suit the user's preference (Chua et al., 2020).

Several methods can be used to provide recommendations (Huseyinov et al., 2021; Mahajan et al., 2021; Maryen et al., 2023; Muliadi & Lestari, 2019; Pham et al., 2024). Neural collaborative filtering method (Huseyinov et al., 2021), machine learning approach (Mahajan et al., 2021), typicality-based collaborative filtering algorithm (Muliadi & Lestari, 2019), convolutional neural network (Pham et al., 2024) were used for developing restaurant recommendation system. It provides a personalized product or service to the user but still had error rate and time consuming.

In this study, the MOORA method will be used as the basis for calculations in the recommendation system. This is because MOORA can determine the objectives of conflicting criteria, where criteria can have beneficial (benefit) or non-beneficial (cost) values (Wardani et al., 2018). The reason for using the MOORA method is that it has a simple and easy-to understand calculation process. This method has a good level of selectivity in determining an alternative. According to previous research, the MOORA method can establish evaluations and rankings of alternatives without any complexity (Pérez-domínguez et al., 2018). The method also offers high flexibility and a good level of selectivity.

# 2. Literature Review

## A. Recommendation System

A Recommendation System is an information system that interacts and provides a collection of information, as well as a model and data manipulation (Muslim & Baihaqi, 2016). Through this system, users are assisted in decision-making, resulting in solutions to existing problems. The Recommendation System consists of several main components, namely:

1. Data subsystem (database): This is one of the supporting components of the system and deals with data management. The data collection is organized by a Database Management System (DBMS). The available data greatly influences decision-making.

2. Model subsystem (model base): This component integrates data with a decision model. The existing decision model should be adaptable to meet the users' needs and align with the evolving data.

3. Dialogue subsystem (user system interface): This component facilitates interaction between the decision system and the users. The implemented interface allows users to communicate using Action Language, Display Language, and Knowledge Language.

## B. MOORA

The Multi-Objective Optimization by Ratio Analysis (MOORA) method was introduced by Brauers and Zavadkas in 2006. MOORA is used to make decisions based on multiple criteria. MOORA is known for its ease of understanding and flexibility in the selection process of criteria weights to decide. It has a good level of selectivity in determining alternative solutions based on the criteria, ranging from highly important to less important. Therefore, MOORA is widely used in various fields of science (Amalia et al., 2019).

The steps for solving a problem using the Multi-Objective Optimization based on Ratio Analysis (MOORA) method are as follows.

1. Inputting Criterion Values
2. Creating a Matrix

X= | x11 x12 x1n |
| x21 x22 x2n |
| xm1 xm2 xmn |

Explanation:

xij = response of alternative j on attribute i, where i = 1, 2, …, n

n = number of targets or attributes

j = 1, 2, ..., m

m = number of alternatives

3. Normalization Matrix
4. Calculating Optimization Values

$$y_i = \sum_{j=1}^{g} w_j x^*_{ij} - \sum_{j=g+1}^{n} w_j x^*_{ij}$$

Explanation:

g = the number of attributes that will be maximized

(n - g) = the number of attributes that will be minimized Wj = the weight assigned to attribute j

yi = the normalized evaluation score of alternative i across all attributes

5. Ranking

## C. End-User Computing Satisfaction (EUCS)

End-User Computing Satisfaction (EUCS) is a method used to measure the level of satisfaction of users of an application system by comparing their expectations with the reality of an information system. The EUCS method was developed by Doll and Torkzadeh (Doll & Deng, 2004). This method has been tested by other researchers to assess its reliability, and the results have shown no significant differences even when the instrument was translated into different languages. The evaluation using this method primarily focuses on the end-user's satisfaction with the technological aspects, assessing five variables: Content, Accuracy, Format, Ease of Use, and Timeliness (Liu & Guo, 2018).

### D. Website

The World Wide Web, also known as the web, is a service that provides information through hyperlinks. It enables computer users to easily browse and search for information on the internet. The web has rapidly evolved into a fast- growing service. In the web, words or images in a document can be highlighted or underlined to link them to other media such as documents, phrases, video clips, or audio files. The web can connect any part of a document or image to any part of another document. Users can click on links using a mouse on a web browser that has a graphical user interface (GUI) (Susilo & Kurniati, 2018).

### E. Likert Scale

The Likert scale is a measurement method used to assess an individual's or group's perception, attitude, or opinion about an event or social phenomenon. There are two forms of questions in the Likert scale: positive questions to measure positive responses and negative questions to measure negative responses. The scale values can be adjusted according to its usage, such as using a scale of 1, 2, 3, 4, 5 (Pranatawijaya & Priskila, 2019).

In this study, the End-User Computing Satisfaction (EUCS) method is used as a method to determine the dimensions of each user survey.

## 3. Methodology

In designing a restaurant recommendation system using the MOORA method based on the web, several stages will be undertaken using the Waterfall method.

### A. Requirement Analysis

The requirement analysis steps are as follows:

1. Literature Review: In this stage, the learning process involves studying various theories related to the research, such as the MOORA method, Information Systems, and the Likert scale. Learning materials are gathered from research journals, ebooks, and websites.

2. Initial Observation: Data collection is conducted in this stage as the basis for system design. The required data includes restaurant prices, operating hours, cleanliness levels, food variety, and ratings. The data collection criteria are determined based on a previous survey. The survey is conducted using 36 respondents from 5 universities. The questions are about food needs, food ordering, food selection and restaurant selection.

3. Data Collection: Valid data is collected from various websites through observation, ensuring accurate weight values for the restaurant selection criteria. We use https://pergikuliner.com/ to collect various criteria of 39 restaurants with rating more than 3, food variation more than 10 and long operating.

### B. System Design

This stage is one way to carry out the system development process by designing the system flow using several diagrams, such as Flowchart. In Figure 1, the flowchart of the admin login page is explained. In this process the admin is on the homepage, the process is continued by clicking input on the admin login button. Next, the admin is directed to the admin login page. The process continues by inputting the username and password. If the data entered matches what is in the database, the admin will be directed to the admin dashboard. On the other hand, if the data entered is not appropriate, the admin is asked to fill in the data again.

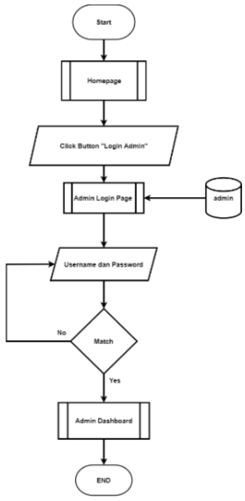


Fig.1: Login Admin

Figure 2 explains the flowchart for the Create, Read process from the Alternative Data page. The process starts from the main dashboard page; the admin provides alternative data sidebar click input. On this page the admin will be shown the data that has been added, the data displayed comes from alternative tables. Admin has the option to add data. The process begins with input, clicking the add data button. The next process is to input alternative data according to the existing form columns. After entering the data, the admin has the option to save the data or reset if he feels that the data entered is not appropriate. Data will be stored on alternative tables.

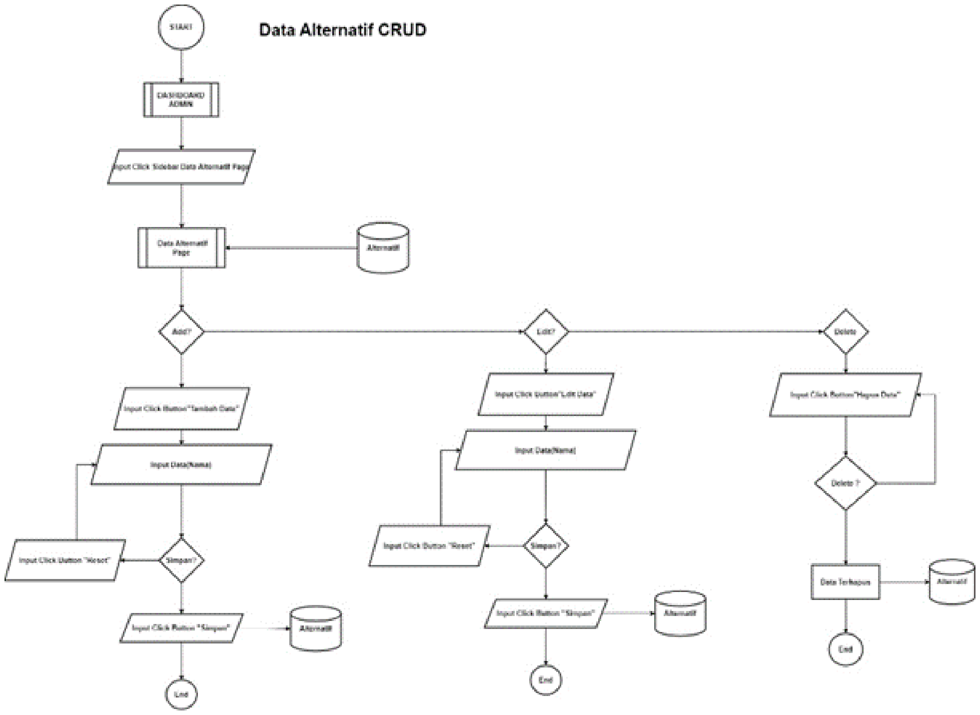


Fig.2: CRUD Data Alternatif

Figure 3 explains the flowchart for the Update, Delete process from the Alternative Data page. The process starts from the main dashboard page; the admin provides alternative data sidebar click input. On this page the admin will be shown the option to edit data or delete data. When the admin chooses to edit data, the process begins with an input click on the edit data button. The next process is to input alternative data according to the existing form columns. After entering the data, the admin has the option to save the data or reset if he feels that the data entered is not appropriate. Data will be stored in alternative tables. Another option is to delete data where the process begins by inputting, clicking the delete data button, then there is confirmation of deleting data. Data will be deleted from the alternative table, otherwise if the data is not deleted it will remain as before.

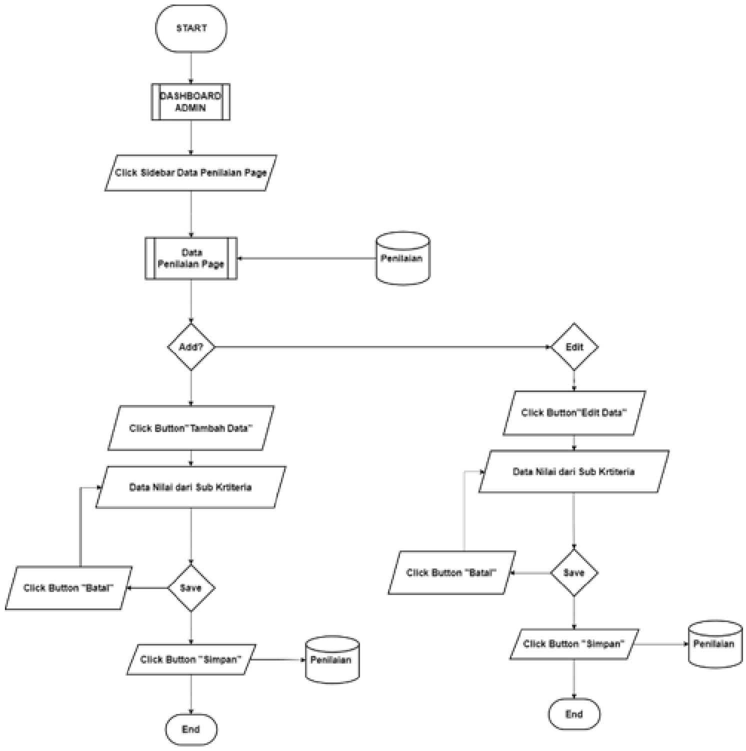


Fig.3: CRUD Assessment Data

Figure 4 explains the flowchart for the Create process, Update from the Assessment Data page. The process starts from the main dashboard page, the admin provides input, click on the assessment data sidebar. On this page the admin will be shown the data that has been added, the data displayed comes from the criteria table. Admin has the option to add data. The process begins with input, click the add data button. The next process is to input the assessment data according to the existing form columns. After entering the data, the admin has the option to save the data or reset if he feels that the data entered is not appropriate. Data will be stored in the sub-criteria table. Figure 4 explains the process of the recommendation page. The process starts from the homepage with the user providing input by clicking the recommendation button on the navbar, then the user will be directed to the recommendations section. The next process is that the user provides input data containing choices from sub-criteria data. The next process is for the user to input the click button for the recommendation results. After that, you will enter the calculation process which begins with calculating the determination of the X matrix, next is the weighting process which is taken based on user input. The next phase is the calculation of the normalized matrix (R), followed by the normalization calculation with weights, and the final calculation process is the calculation of the yi value. After all the calculations, the recommendation results are obtained based on the ranking of the results of the yi value calculations.

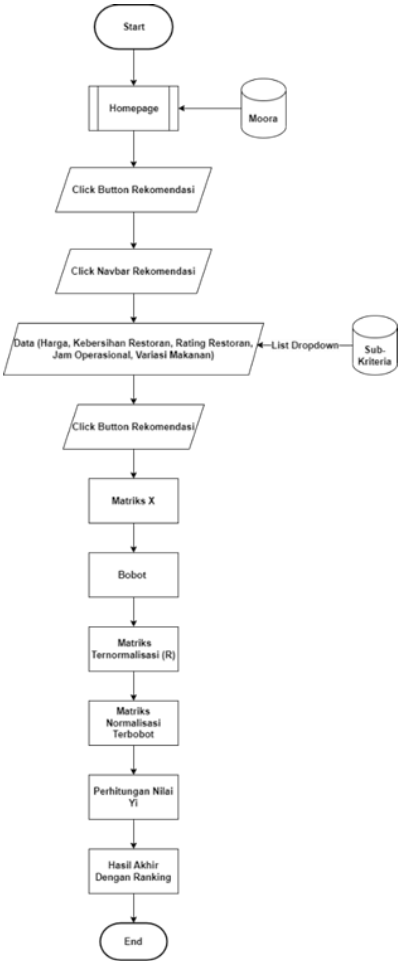

Fig.4: Recommendation System

MOORA is a flexible and easy method for decision making with various properties. It is possible to separate the subjective aspects into some criteria of the evaluation process. It can identify targets which may have favorable (benefit) or unfavorable (cost) value and give the best alternative. The following are the steps of MOORA (Maryen et al., 2023):

1. Determine the relevant evaluation attributes;
2. Create a decision matrix with all available information for each attributes;
3. Calculate the denominator value;
4. Perform normalization for multi-objective optimization;
5. Calculate the Yi value to normalized evaluation value.

### C. Testing and Evaluation

Website testing is carried out by distributing based questionnaires end user computing satisfaction (EUCS) model. The questionnaire consists of 5 aspects: convenience, appearance, completeness of data, accuracy and timeliness. The questions are about content (4 questions), accuracy (2 questions), format (4 questions), ease of use (4 questions) and timeliness (2 questions). The respondents are 32 respondents.

## 4. Result and Discussion

### A. Requirement Analysis

Data collection results showed that 36 respondents come from 5 various universities: Universitas Multimedia Nusantara, Universitas Pradita, Universitas Gunadarma, Universitas Bina Nusantara and Universitas Prasetiya Mulya. An amount of 58.3 % respondents chose food needs as highest need (10 scale). An amount of 91.7 % were confused about choosing restaurants. The five top factors were price (94.4 %), cleanliness (77.8 %), ratings (75 %), food variety (72.2 %), and operating hours (63.9 %).

## B. System Design

The user interface was shown in Figure 5. There are several sections on the homepage display. The first part is the navbar as a as a user navigation tool when using the recommendation system. There are 2 buttons, namely home and recommendations. Figure 6 explains the appearance of recommendation system. There are several inputs to determine the system results recommendation.


Fig.5: Homepage User Interface

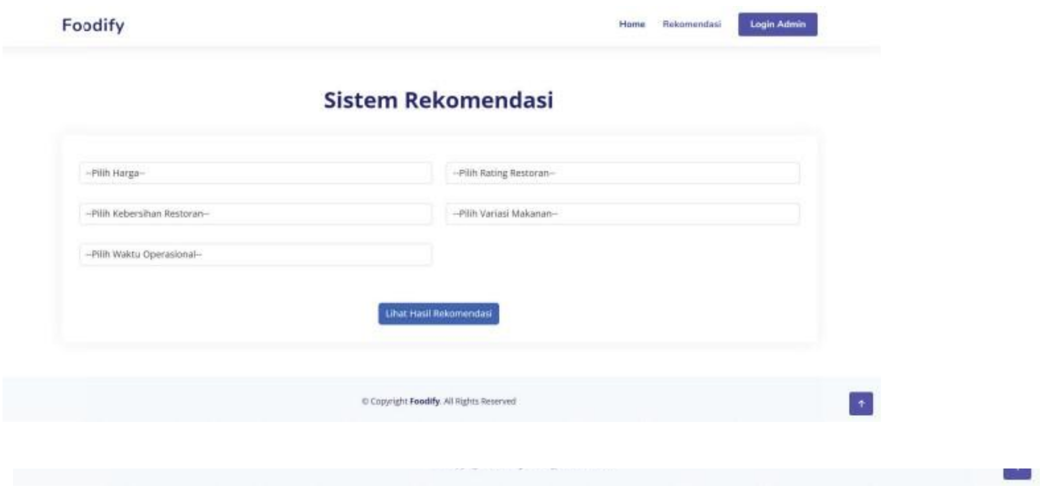


Fig.6: Recommendation System Page

In Table 1 it is explained that after the criteria are determined, a relative weight will be given to each criterion. This weight reflects the level of importance of these criteria in decision making. Weights can be given in the form of a percentage or other scale. the total weight for all criteria is 1 (or 100%).

Table 1. Restaurant Criteria Weights

| Alternatif | C1 | C2 | C3 | C4 | C5 |
|---|---|---|---|---|---|
| A1 | 5 | 3 | 1 | 1 | 5 |
| A2 | 3 | 4 | 3 | 3 | 4 |

| | | | | | |
|---|---|---|---|---|---|
| A3 | 2 | 4 | 2 | 2 | 3 |
| A4 | 2 | 4 | 3 | 3 | 3 |
| A5 | 2 | 4 | 3 | 3 | 3 |
| A6 | 2 | 3 | 3 | 3 | 3 |
| A7 | 2 | 3 | 2 | 2 | 2 |
| A8 | 4 | 3 | 2 | 2 | 3 |
| A9 | 4 | 4 | 3 | 2 | 2 |
| A10 | 3 | 3 | 2 | 2 | 3 |
| A11 | 3 | 3 | 3 | 2 | 3 |
| A12 | 3 | 3 | 2 | 3 | 3 |
| A13 | 2 | 3 | 2 | 3 | 2 |
| A14 | 4 | 3 | 2 | 2 | 3 |
| A15 | 3 | 3 | 3 | 1 | 3 |
| A16 | 2 | 4 | 3 | 3 | 3 |
| A17 | 2 | 3 | 2 | 3 | 2 |
| A18 | 3 | 3 | 3 | 2 | 3 |
| A19 | 4 | 3 | 2 | 3 | 3 |
| A20 | 4 | 4 | 3 | 3 | 3 |
| A21 | 3 | 4 | 3 | 3 | 3 |
| A22 | 2 | 4 | 3 | 3 | 3 |
| A23 | 2 | 3 | 3 | 2 | 3 |
| A24 | 4 | 3 | 2 | 3 | 3 |
| A25 | 2 | 4 | 3 | 2 | 3 |
| A26 | 2 | 4 | 3 | 3 | 1 |

Table 2 describes the results of calculating all weight values squared, the denominator value will later be used to obtain a normalized value.

Table 2. Denominator Table

| | | | | | |
|---|---|---|---|---|---|
| Denominator | 17.32050808 | 21.47091055 | 16.40121947 | 15.84297952 | 18.13835715 |

In Table 3 it is explained for each value in the decision matrix with the corresponding square root calculated in the previous step. This will produce a normalized value for each cell in the decision matrix.

Table 3. Normalization

| Alternatif | C1 | C2 | C3 | C4 | C5 |
|---|---|---|---|---|---|
| A1 | 0.288675135 | 0.13972393 | 0.060971076 | 0.06311944 | 0.275658923 |
| A2 | 0.173205081 | 0.186298573 | 0.182913228 | 0.189358321 | 0.220527139 |
| A3 | 0.115470054 | 0.186298573 | 0.121942152 | 0.126238881 | 0.165395354 |
| A4 | 0.115470054 | 0.186298573 | 0.182913228 | 0.189358321 | 0.165395354 |
| A5 | 0.115470054 | 0.186298573 | 0.182913228 | 0.189358321 | 0.165395354 |

| | | | | | |
|---|---|---|---|---|---|
| A6 | 0.115470054 | 0.13972393 | 0.182913228 | 0.189358321 | 0.165395354 |
| A7 | 0.115470054 | 0.13972393 | 0.121942152 | 0.126238881 | 0.110263569 |
| A8 | 0.230940108 | 0.13972393 | 0.121942152 | 0.126238881 | 0.165395354 |
| A9 | 0.230940108 | 0.186298573 | 0.182913228 | 0.126238881 | 0.110263569 |
| A10 | 0.173205081 | 0.13972393 | 0.121942152 | 0.126238881 | 0.165395354 |
| A11 | 0.173205081 | 0.13972393 | 0.182913228 | 0.126238881 | 0.165395354 |
| A12 | 0.173205081 | 0.13972393 | 0.121942152 | 0.189358321 | 0.165395354 |
| A13 | 0.115470054 | 0.13972393 | 0.121942152 | 0.189358321 | 0.110263569 |
| A14 | 0.230940108 | 0.13972393 | 0.121942152 | 0.126238881 | 0.165395354 |
| A15 | 0.173205081 | 0.13972393 | 0.182913228 | 0.06311944 | 0.165395354 |
| A16 | 0.115470054 | 0.186298573 | 0.182913228 | 0.189358321 | 0.165395354 |
| A17 | 0.115470054 | 0.13972393 | 0.121942152 | 0.189358321 | 0.110263569 |
| A18 | 0.173205081 | 0.13972393 | 0.182913228 | 0.126238881 | 0.165395354 |
| A19 | 0.230940108 | 0.13972393 | 0.121942152 | 0.189358321 | 0.165395354 |
| A20 | 0.230940108 | 0.186298573 | 0.182913228 | 0.189358321 | 0.165395354 |
| A21 | 0.173205081 | 0.186298573 | 0.182913228 | 0.189358321 | 0.165395354 |
| A22 | 0.115470054 | 0.186298573 | 0.182913228 | 0.189358321 | 0.165395354 |
| A23 | 0.115470054 | 0.13972393 | 0.182913228 | 0.126238881 | 0.165395354 |
| A24 | 0.230940108 | 0.13972393 | 0.121942152 | 0.189358321 | 0.165395354 |
| A25 | 0.115470054 | 0.186298573 | 0.182913228 | 0.126238881 | 0.165395354 |
| A26 | 0.115470054 | 0.186298573 | 0.182913228 | 0.189358321 | 0.055131785 |
| A27 | 0.115470054 | 0.13972393 | 0.182913228 | 0.189358321 | 0.165395354 |
| A28 | 0.115470054 | 0.13972393 | 0.182913228 | 0.189358321 | 0.110263569 |
| A29 | 0.173205081 | 0.186298573 | 0.182913228 | 0.189358321 | 0.165395354 |
| A30 | 0.115470054 | 0.186298573 | 0.182913228 | 0.126238881 | 0.165395354 |
| A31 | 0.173205081 | 0.13972393 | 0.121942152 | 0.126238881 | 0.165395354 |
| A32 | 0.115470054 | 0.13972393 | 0.121942152 | 0.189358321 | 0.165395354 |
| A33 | 0.115470054 | 0.186298573 | 0.182913228 | 0.189358321 | 0.220527139 |
| A34 | 0.115470054 | 0.186298573 | 0.182913228 | 0.126238881 | 0.110263569 |
| A35 | 0.115470054 | 0.186298573 | 0.182913228 | 0.189358321 | 0.110263569 |
| A36 | 0.173205081 | 0.186298573 | 0.182913228 | 0.189358321 | 0.165395354 |
| A37 | 0.173205081 | 0.13972393 | 0.182913228 | 0.126238881 | 0.165395354 |
| A38 | 0.115470054 | 0.13972393 | 0.121942152 | 0.126238881 | 0.165395354 |

In Table 4 it is explained that the weight value is the trial weight value, this value is obtained by taking the value randomly. This value will be used for weighted normalization calculations.

Table 4. Trial Weight Value

| | | | | | |
|---|---|---|---|---|---|
| Weight | 5 | 3 | 3 | 3 | 4 |

In Table 5 it is explained for each normalized value in the decision matrix, multiplied by that value with the appropriate weight for the associated criteria. This is done by multiplying each normalized value by its corresponding weight in a weighted decision matrix.

Table 5. Weighted Normalization

| | | | | | |
|---|---|---|---|---|---|
| A1 | 1.443 | 0.419 | 0.183 | 0.189 | 1.103 |
| A2 | 0.866 | 0.559 | 0.549 | 0.568 | 0.882 |
| A3 | 0.577 | 0.559 | 0.366 | 0.379 | 0.662 |
| A4 | 0.577 | 0.559 | 0.549 | 0.568 | 0.662 |
| A5 | 0.577 | 0.559 | 0.549 | 0.568 | 0.662 |
| A6 | 0.577 | 0.419 | 0.549 | 0.568 | 0.662 |
| A7 | 0.577 | 0.419 | 0.366 | 0.379 | 0.441 |
| A8 | 1.155 | 0.419 | 0.366 | 0.379 | 0.662 |
| A9 | 1.155 | 0.559 | 0.549 | 0.379 | 0.441 |
| A10 | 0.866 | 0.419 | 0.366 | 0.379 | 0.662 |
| A11 | 0.866 | 0.419 | 0.549 | 0.379 | 0.662 |
| A12 | 0.866 | 0.419 | 0.366 | 0.568 | 0.662 |
| A13 | 0.577 | 0.419 | 0.366 | 0.568 | 0.441 |
| A14 | 1.155 | 0.419 | 0.366 | 0.379 | 0.662 |
| A15 | 0.866 | 0.419 | 0.549 | 0.189 | 0.662 |
| A16 | 0.577 | 0.559 | 0.549 | 0.568 | 0.662 |
| A17 | 0.577 | 0.419 | 0.366 | 0.568 | 0.441 |
| A18 | 0.866 | 0.419 | 0.549 | 0.379 | 0.662 |
| A19 | 1.155 | 0.419 | 0.366 | 0.568 | 0.662 |
| A20 | 1.155 | 0.559 | 0.549 | 0.568 | 0.662 |
| A21 | 0.866 | 0.559 | 0.549 | 0.568 | 0.662 |
| A22 | 0.577 | 0.559 | 0.549 | 0.568 | 0.662 |
| A23 | 0.577 | 0.419 | 0.549 | 0.379 | 0.662 |

In Table 6 it is explained for the values obtained by calculating the distance between alternatives with positive ideal solutions (MAX) and negative ideal solutions (MIN). First, we normalize and weight the decision matrix. Then, we find positive and negative ideal solutions by selecting the largest and smallest values for each criterion. Next, we calculate the alternative distances to the positive and negative ideal solutions by calculating the subtraction between the MAX-MIN values. By calculating the comparison of these distances, we can obtain the Yi value for each alternative. The Yi value is used for ranking, where the alternative with a higher Yi value is considered better. Based on Yi value, A33 is the first ranking, followed by A4, A5, A16 and A22 with same Yi value.

Table 6. Yi value

| Alternatif | MAX | MIN | Yi (Max-Min) | Rank |
|---|---|---|---|---|
| A1 | 1.894079032 | 1.443375673 | 0.450703359 | 38 |

| | | | | |
|---|---|---|---|---|
| A2 | 2.557818921 | 0.866025404 | 1.691793517 | 6 |
| A3 | 1.965020233 | 0.577350269 | 1.387669964 | 18 |
| **A4** | **2.337291783** | **0.577350269** | **1.759941513** | **2** |
| **A5** | **2.337291783** | **0.577350269** | **1.759941513** | **2** |
| A6 | 2.197567853 | 0.577350269 | 1.620217584 | 7 |
| A7 | 1.604769165 | 0.577350269 | 1.027418896 | 29 |
| A8 | 1.825296304 | 1.154700538 | 0.670595765 | 36 |
| A9 | 1.927406323 | 1.154700538 | 0.772705785 | 35 |
| A10 | 1.825296304 | 0.866025404 | 0.9592709 | 30 |
| A11 | 2.008209532 | 0.866025404 | 1.142184128 | 26 |
| A12 | 2.014654625 | 0.866025404 | 1.148629221 | 25 |
| A13 | 1.794127486 | 0.577350269 | 1.216777217 | 22 |
| A14 | 1.825296304 | 1.154700538 | 0.670595765 | 36 |
| A15 | 1.818851211 | 0.866025404 | 0.952825807 | 32 |
| **A16** | **2.337291783** | **0.577350269** | **1.759941513** | **2** |
| A17 | 1.794127486 | 0.577350269 | 1.216777217 | 22 |
| A18 | 2.008209532 | 0.866025404 | 1.142184128 | 26 |
| A19 | 2.014654625 | 1.154700538 | 0.859954086 | 33 |
| A20 | 2.337291783 | 1.154700538 | 1.182591244 | 24 |
| A21 | 2.337291783 | 0.866025404 | 1.471266379 | 12 |
| **A22** | **2.337291783** | **0.577350269** | **1.759941513** | **2** |
| A23 | 2.008209532 | 0.577350269 | 1.430859263 | 16 |
| A24 | 2.014654625 | 1.154700538 | 0.859954086 | 33 |
| A25 | 2.147933462 | 0.577350269 | 1.570583193 | 9 |
| A26 | 1.896237506 | 0.577350269 | 1.318887236 | 20 |
| A27 | 2.197567853 | 0.577350269 | 1.620217584 | 7 |
| A28 | 1.977040714 | 0.577350269 | 1.399690445 | 17 |
| A29 | 2.337291783 | 0.866025404 | 1.471266379 | 12 |
| A30 | 2.147933462 | 0.577350269 | 1.570583193 | 9 |
| A31 | 1.825296304 | 0.866025404 | 0.9592709 | 30 |
| A32 | 2.014654625 | 0.577350269 | 1.437304355 | 15 |
| **A33** | **2.557818921** | **0.577350269** | **1.980468652** | **1** |
| A34 | 1.927406323 | 0.577350269 | 1.350056054 | 19 |
| A35 | 2.116764644 | 0.577350269 | 1.539414375 | 11 |
| A36 | 2.337291783 | 0.866025404 | 1.471266379 | 12 |
| A37 | 2.008209532 | 0.866025404 | 1.142184128 | 26 |
| A38 | 1.825296304 | 0.577350269 | 1.247946034 | 21 |

### C. Testing and Evaluation

The website trial was carried out by distributing questionnaires based on the end user computing satisfaction (EUCS) model. The questionnaire consists of 5 aspects, namely convenience, appearance, data completeness, accuracy, and timeliness. The analysis results of respondent's satisfaction levels are presented in Table 7. Based on the above calculations, user testing of usability testing to measure user satisfaction levels is **87.53%** which can be categorized as users strongly agree that the restaurant selection recommendation system in this study is running well.

Table 7. Respondent's Satisfaction Levels

| Dimension | Satisfaction Levels (%) |
| --- | --- |
| Content | 84.8 |
| Accuracy | 86.75 |
| Format | 86.8 |
| Ease of Use | 90.8 |
| Timeliness | 88.5 |
| **Total** | **87.53** |

Overall, this study tried to present approach based on MOORA method to give restaurant recommendation system. Recommendation system is simple algorithm which can provide the most relevant and accurate results to the users. It is filtering a huge pool of information into useful stuff by discovering data patterns in the data set about user's choices (Sai & Pavani, 2021). Recommendation system are widely popular to select preferred restaurants based on user-specified criteria (Dastidar, 2017). Based on MOORA, A33 is a recommended restaurant based on criteria filters and MOORA calculations. This result was obtained with standardize the criteria for price, operating hours, cleanliness, food variety, and ratings in Gading Serpong. EUCS testing also shows that the system runs well with respondent's satisfaction level 87.53 %. MOORA also used to give recommendation in choosing café in Jayapura. Based on testing, the system can run well without any program errors, but the research didn't show respondent's satisfaction result (Maryen et al., 2023). The limitation of present study is uncertainty consideration in determining the assessment criteria value and prioritizing risks in a fuzzy environment. Future research direction can use fuzzy logic and fuzzy MOORA. Besides that, generalizability of geographical area and completeness of restaurant's data may be influenced the quality. Future research directions could include expanding the study to other geographical areas, incorporating more diverse criteria for restaurant selection, and exploring the integration of user feedback and learning mechanisms to improve the system's recommendations over time.

## 5. Conclusion

This study presents the development of a web-based restaurant recommendation system using the MOORA method, specifically targeted at the Gading Serpong area in Indonesia. The system aims to assist users in making informed decisions when selecting a restaurant by considering multiple criteria such as price, operating hours, cleanliness, food variety, and ratings. The MOORA method is employed to rank restaurants based on these criteria, providing users with personalized recommendations.

The effectiveness of the developed system is evaluated using the EUCS method, which assesses user satisfaction across five dimensions: content, accuracy, format, ease of use, and timeliness. The evaluation results indicate an overall user satisfaction rate of 87.53%, suggesting that users strongly agree with the usefulness and effectiveness of the recommendation system.

The main contributions of this study lie in the application of the MOORA method for restaurant recommendation and the emphasis on user satisfaction evaluation in system development. The findings highlight the potential of multi-criteria decision-making methods in enhancing user decision-making processes and the importance of considering user perspectives in the design and evaluation of recommendation systems.

However, the study has some limitations that should be acknowledged. The research focuses on a specific geographical area, and the generalizability of the findings to other contexts may be limited. Additionally, the system's performance may be influenced by the quality and completeness of the restaurant data used. Future research directions could include expanding the study to other geographical areas, incorporating more diverse criteria for restaurant selection, and exploring the integration of user feedback and learning mechanisms to improve the system's recommendations over time. Furthermore, conducting a longitudinal study to assess the long-term impact of the recommendation system on user decision-making and satisfaction would provide valuable insights. Besides that, uncertainty consideration in determining the assessment criteria value and prioritizing risks in a fuzzy environment is limited. Future research direction can use fuzzy logic and fuzzy MOORA

## Acknowledgements

The authors would like to thank Universitas Multimedia Nusantara for their support of this research work.

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