Journal of Information System Research (JOSH)
Volume 5, No. 1, Oktober 2023, pp 271−280
ISSN 2686-228X (media online)
https://ejurnal.seminar-id.com/index.php/josh/
DOI 10.47065/josh.v5i1.4412

Cafe Menu Selection Recommendations using the Simple Additive Weighting (SAW) Method

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Submitted: **13/10/2023;** Accepted: **28/10/2023;** Published: **29/10/2023**

Abstract-In today's modern era, cafes serve a variety of food and beverage menus to their customers. However, this high diversity often leads to problems in selecting menus that suit customer preferences. The main problem faced is the difficulty for customers in choosing the menu that best suits their personal tastes and preferences, given the large number and variety of menus offered by the cafe. The purpose of this research is to find a solution to the problem of selecting a cafe menu using the Simple Additive Weighting (SAW) method. The SAW method is applied to analyze cafe menu data and provide the most suitable menu recommendations based on individual preferences. There are 6 criteria applied in this study to match customer preferences, namely price, portion size, level of popularity, quality of ingredients, compatibility with taste, and aesthetic aspects. It is hoped that this research can provide better guidance for cafe customers in choosing a menu that suits their tastes, as well as help cafe owners in increasing customer satisfaction and sales. The results of calculations using the SAW method that has been carried out get the results of 5 menus that become recommendations because they get the top rank, first Alternative A1 menu Oatmeal Protein Shake has the highest rank with a score of 0.86, second alternative A7 menu Pepperoni Pizza with a score of 0.847, third alternative A4 menu Ramen Noodle with a score of 0.813. fourth alternative A1 menu Alfredo Spaghetti with a score of 0.766 and the fifth Alternative A8 menu Seafood Fried Rice with a score of 0.738.

Keywords: Recomendation; Cafe; Menu; Simple Additive Weighting (SAW)

1. INTRODUCTION

The cafe industry is one of the sectors that continues to grow and continues to produce innovations and various new developments [1]. This increase can be observed through a significant surge in the number of manufacturers and entrepreneurs actively operating in the food and beverage industry [2]. Indonesia has been a major player in the food and beverage industry sector, contributing significantly with a share of around 5.5 percent In addition, in terms of percentage to the national Gross Domestic Product (GDP), the sector also contributes around 31 percent to the Gross Domestic Product in the non-oil and gas processing sector [3].

Cafes that are growing over time also face increasingly fierce competition in this business. There are important action steps that need to be taken to increase the level of customer satisfaction related to the improvement of the menu selection process at the cafe. A cafe is not only a place to enjoy a good meal, but it is also a suitable environment for relaxing and social interaction. Because of this, cafes often attract customers with a wide range of varied menu options. However, this diversity can sometimes make customers feel confused when it comes to choosing the menu they want to order. This consideration arises due to the difficulty in recognizing the menus that customers are interested in. This situation is a challenge that must be faced by cafe owners, who need to present a variety of menu choices according to customer tastes. Thus, an effective solution is needed to overcome this problem through the right decision-making process with the Simple Additive Weighting (SAW) method [4].

Simple Additive Weight (SAW) method It is known as a decision-making method that involves finding the best alternative from a number of choices that match the predetermined criteria. After that, the summation process with relevant weights is carried out, followed by ranking alternatives to select predetermined alternatives [5], [6]. People who make decisions can easily understand this strategy because the working principle is quite easy to understand [7]. When choosing a menu, various factors can serve as criteria, including cost, portion size, popularity, ingredient quality, taste compatibility, and aesthetic considerations. Cafe owners have the flexibility to give weight to each of these criteria based on their level of importance by applying the SAW Method. Each item in the menu will be assessed using the SAW method after the weights have been determined. The menu that gets the highest score will be considered the best option recommended to customers to choose from.

When compared to other methods, the Simple Additive Weighting (SAW) method has the advantages of [8] Its advantage lies in its ability to make more precise judgments because it is based on predetermined criteria values and preference weights, In addition, SAW can also choose the best alternative from a number of existing alternatives due to the ranking process after determining the weight value for each attribute, The total change in value produced is more, so it is very relevant for solving decision-making problems, and is able to solve decision-making problems [9],[10]. In addition to the advantages, the SAW method also has disadvantages, namely this method is only used in local weighting and calculations carried out using crisp and fuzzy numbers and there are differences in the calculation of matrix normalization according to the value of the attribute (between the values of advantages and disadvantages) [11].

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There are several previous studies that discuss the selection process in various cases with various decision-making methods used, including research [12] by applying the Simple Multi Attribute Rating Technique (SMART) method used for selecting cafes of interest, there are 5 criteria used, namely price, location, service, facilities, and menu variations. The final results of this study show that the system can help potential customers in choosing a cafe that suits customer preferences, testing is done manually and using the system by inputting existing criteria then running the SMART method for the calculation process so as to provide the right results according to customer needs. Research [13] by applying the Technique for Others Reference by Similarity to Ideal Solution (TOPSIS) method to select outstanding employees, there are 5 criteria used in this study, namely attendance, achievement, cooperation, complaints, and performance. This is used to facilitate the management of Hugos Cafe Malang in assessing employee performance more objectively and thoroughly. Based on the analysis of research [14] which applies the Simple Additive Weighting (SAW) method to select the best schools in Jambi, there are 5 criteria applied in this selection process, namely school achievement, school environment, school accreditation, curriculum implementation, and availability of extracurricular activities. So it can be concluded that using the SAW method can make the process easier and more effective because it displays the results of weighting and calculation based on existing criteria. School Environment is the highest value of the calculation results with a value of 14.5.

Furthermore, research [15] discusses the determination of a healthy food menu using the SAW method, nutritional content (NC), calories per serving (CS), flavoring ingredients (FI) and expiration time (ET). This method is used to select a detailed healthy food menu. In the calculation process, four alternative healthy food menus were used as samples. Of the four menus, there is one menu with the highest value, namely red bean soup (A1) with a value of 0.95. This menu then becomes the best recommendation for healthy food menu choices. Research conducted by [16] to choose food for people with hypertension using the Technique for Others Reference by Similarity to Ideal Solution (TOPSIS) method, there are 5 criteria that have been determined in this method, namely carbohydrates, protein, fat, processing and salt. The Topsis method makes it easier for nutritionists to make more accurate decisions in providing food to people with hypertension, the results obtained in this study show steamed potato food to be the highest value which obtained a value of 0.6654, mung bean porridge with a value of 0.6373, and red beans produce a value of 0.6013.

Based on the explanation that has been described, this research aims to further explore the use of the SAW method in an effort to improve the efficiency of the menu selection process in a cafe. This research will improve quality for cafe owners by increasing efficiency in developing menus and meeting customer expectations. This is achieved by selecting the appropriate criteria, allocating the right weights, and collecting data related to the menu and the criteria that have been set.

2. RESEARCH METHODOLOGY

2.1 Research Stages

The stages in this research can be presented through various visuals that illustrate the application of the Simple Additive Weighting (SAW) method in [17] the context of selecting menu recommendations in cafes. This process goes according to plan, follows a structured sequence, and is executed with a disorganized approach in achieving the set goals [18]. There are several stages of implementation that can be seen in Figure 1.

Figure 1. Research Stages

All stages of implementation in Figure 1 can be described in detail as follows:

1. Problem identification stage
   The initial stage where researchers search, identify and formulate problems that will be the main focus in this study. In the process of selecting a large and varied cafe menu, this can cause customer confusion and difficulty in choosing a menu that suits customer preferences.
2. Data collection stage
   Steps taken to collect relevant data in order to achieve the objectives in the research [19]. In this study the authors studied menu data in the cafe to be able to optimize the menu ordering process and conducted 2 ways of collecting data, namely by observation and literature study as follows:
   a. Observation

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Observation is done by observing and documenting events, actions, or events that occur directly without disturbing the object or topic being observed.

b. Literature Study
Data collection in literature studies is carried out through the process of searching and collecting, reading and reviewing sources related to the title of the research taken. Literature sources can be obtained from theses, journals, e-books, and others.

3. The application stage of the Simple Additive Weighting (SAW) method
At this stage, the author applies the Simple Additive Weighting (SAW) method to the existing menu data to find a recommendation menu and according to customer preferences.
4. Results and Conclusion Stage
The final stage after the application process of the Simple Additive Weighting (SAW) method is the results and conclusions of the cafe menu selection recommendations using the Simple Additive Weighting (SAW) method. This can increase customer effectiveness in the menu selection process at a cafe.

2.2 Simple Additive Weighting (SAW)

Simple Additive Weighting (SAW) is a selection method used in the ranking process. This SAW method focuses on determining the total weight of each criterion on each alternative. In addition, this method also requires users to normalize the value (X) to match the estimated options available practically [20]. There are several stages in applying the Simple Additive Weighting (SAW) method that will be utilized to handle a problem [21] in this study can be seen in Figure 2.

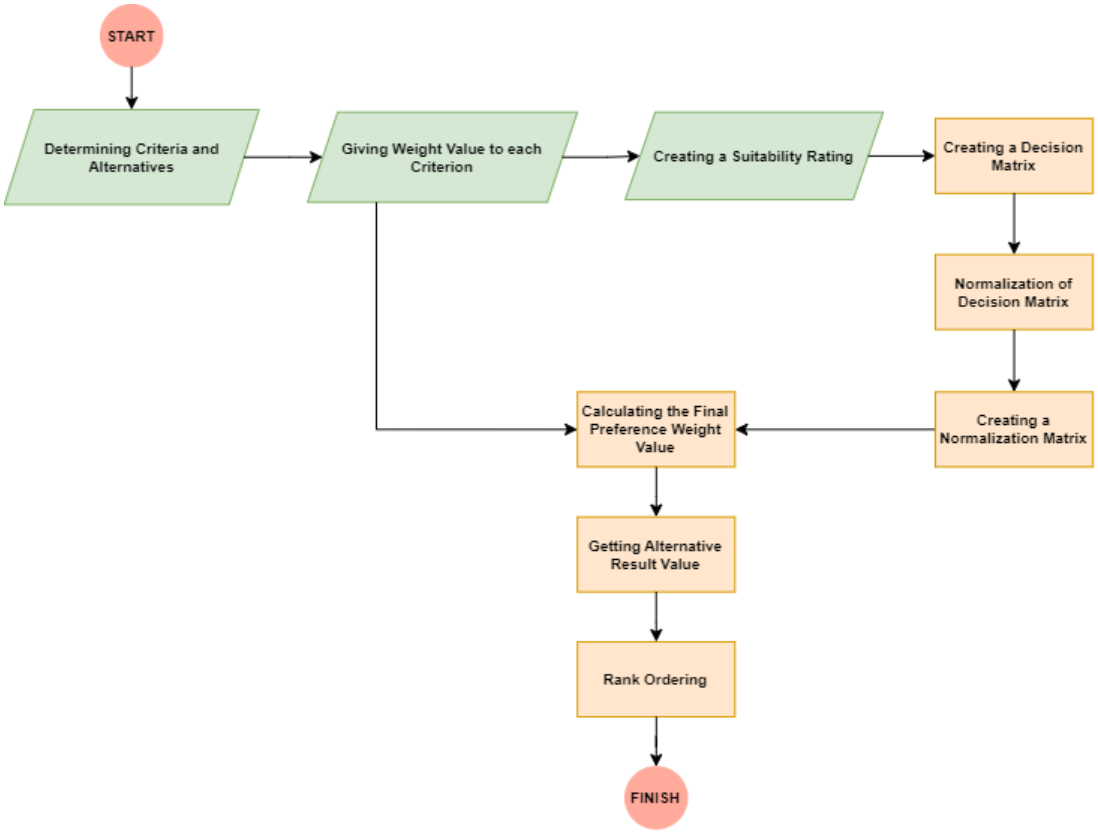

Figure 2. Stages of SAW method implementation

1. The initial stage involves defining the criteria that will serve as the benchmarks in the decision-making process, depicted as by Ci. There are 6 criteria used in this study, namely:
C1 = Quality of Ingredients
C2 = Portion
C3 = Popularity
C4 = Price
C5 = Taste
C6 = Aesthetics
2. Identify alternatives, which are symbolized as Ai. This study has an alternative menu of 20 menus.
3. Give a score for the suitability of each option in each criterion.
4. Additionally, create a scoring table for assessing the degree of suitability of each option for each criterion.

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5. Construct a decision matrix (X) by utilizing the data from the scoring table. The matrix value (X) is the rating value of each option (Ai) on each predetermined criterion (Ci), namely i = 1, 2, ... m and j = 1, 2, ... n. The following X matrix will be used in decision making:

$$X = \begin{bmatrix} X11 & X12 & \dots & Xj \\ . & . & . & . \\ . & . & . & . \\ Xi1 & Xi2 & \dots & Xij \end{bmatrix} \quad (1)$$

6. To carry out the decision matrix normalization process, it is necessary to first calculate the normalized performance assessment value (r_{ij}) for each alternative (A~~i~~) on each criterion (C_i). There are two main characteristics, namely benefit characteristics and cost characteristics, which are used in the matrix equation as follows:

$$R_{ij} = \frac{xij}{\text{Maxi xij}} \quad (2)$$

The calculation above shows if j is a Benefit characteristic. The largest value is the best in Benefit.

$$R_{ij} = \frac{\text{Mini xij}}{xij} \quad (3)$$

R_{ij} is the normalized performance appraisal score, while X_{ij} refers to the elements located in a particular row and column in the matrix, Maximum X_{ij} is the highest value found in each criterion, while Minimum X_{ij} is the lowest value found in each criterion.

7. Using the normalized performance rating value (r_{ij}) to form a normalized matrix (R)
8. To get the final preference value (Vi), add up the multiplication of the normalized matrix row elements (R) with the corresponding preference weights (W) on each matrix column element (W).

$$V_i = \sum_{j=1}^{n} wjrij \quad (4)$$

It can be explained where Vi is the ranking for each choice, wj is the weight score of each criterion denoted as the value (weight) of the criteria, while rij refers to the normalized performance value. So, if the value of Vi is higher, then alternative Ai will be the preferred choice.

3. RESULT AND DISCUSSION

3.1 Application of Simple Additive Weighting (SAW) Method

The menu available in the cafe will be selected based on predetermined criteria. The application of the Simple Additive Weighting (SAW) method is used for the selection of existing menu recommendations based on customer preferences. The procedure for applying the Simple Additive Weighting (SAW) method is as follows:

1. Criteria (C_i)
   Determine the criteria (C_i) that will be utilized in the decision-making process. Table 1 shows the criteria that will be used. There are 6 criteria, namely price, portion, popularity, quality of ingredients, taste and aesthetics.

Table 1. Menu Criteria Table

No.	Kriteria (C_i)	Description	Atribut	Bobot
1.	C1	Quality of Ingredients	Benefit	0,2
2.	C2	Portion	Benefit	0,2
3.	C3	Popularity	Benefit	0,15
4.	C4	Price	Cost	0,2
5.	C5	Taste	Benefit	0,1
6.	C6	Aesthetics	Benefit	0,15

2. Alternative (Ai)
   Identifying Alternatives (Ai) taken from the menu available at the cafe. In table 2 there are 20 alternative menus that are definitely utilized in this research.

Table 2. Menu Alternative Data

Alternative	Name of Menu	C_1	C_2	C_3	C_4	C_5	C_6
A_1	Alfredo Spaghetti	Inferior Quality	Medium	Trendy	‘Rp35.000’	Salty	Appetizing
A_2	Vegetarian Burger	Inferior Quality	Small	Trendy	‘Rp30.000’	Salty	Appetizing
A_3	Chicken Wrap	Inferior Quality	Small	Trendy	‘Rp28.000’	Salty	Appetizing

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Alternative	Name of Menu	C_1	C_2	C_3	C_4	C_5	C_6
A_4	Ramen Noodle	Inferior Quality	Large	Trendy	‘Rp32.000’	Spicy	Appetizing
A_5	Seafood fried rice	Exceptional Quality	Medium	Trendy	‘Rp30.000’	Spicy	Unappetizing
A_6	Pannacotta	Poor Quality	Small	Untrendy	‘Rp21.000’	Sweet	Appetizing
A_7	Pepperoni Pizza	Exceptional Quality	Large	Trendy	‘Rp40.000’	Spicy	Appetizing
A_8	Porterhouse Steak	Exceptional Quality	Medium	Untrendy	‘Rp50.000’	Spicy	Unappetizing
A_9	Tomyam Noodle	Poor Quality	Medium	Trendy	‘Rp35.000’	Sour	Unappetizing
A_{10}	Chocolate Mouse	Inferior Quality	Small	Trendy	‘Rp25.000’	Sweet	Unappetizing
A_{11}	Mango Lasi Smoothies	Inferior Quality	Medium	Untrendy	‘Rp25.000’	Sour	Unappetizing
A_{12}	Berry Sparkler	Poor Quality	Small	Untrendy	‘Rp28.000’	Sweet	Appetizing
A_{13}	Minty Peach Cooler	Inferior Quality	Small	Untrendy	‘Rp30.000’	Sweet	Unappetizing
A_{14}	Pineapple Float	Inferior Quality	Medium	Trendy	‘Rp26.000’	Sweet	Appetizing
A_{15}	Orange Creamsicle Float	Poor Quality	Medium	Trendy	‘Rp28.000’	Sweet	Appetizing
A_{16}	Pour-Over Coffee	Poor Quality	Small	Untrendy	‘Rp30.000’	Bitter	Unappetizing
A_{17}	Cappuccino	Inferior Quality	Medium	Trendy	‘Rp20.000’	Bitter	Unappetizing
A_{18}	Oatmeal Protein Shake	Exceptional Quality	Large	Trendy	‘Rp32.000’	Sweet	Appetizing
A_{19}	Chocolate Chip Frappuccino	Inferior Quality	Medium	Trendy	‘Rp31.000’	Bitter	Unappetizing
A_{20}	Frozen Lemon Slushie	Poor Quality	Large	Trendy	‘Rp20.000’	Sour	Unappetizing

3. Sub Criteria Weight Value
   Giving value to each predetermined criterion. Assessment of each sub-criteria based on crisp values: i = 1, 2, ..., m and j = 1, 2, ..., n [16]. Table 3 shows the sub criteria and weight values carried out in this study.

Table 3. Weight Value of Sub Criteria

Criteria	Sub Criteria	Weight
Price	20.000 – 25.000	1
	26.000 – 35.000	2
	36.000 – 45.000	3
	46.000 – 50.000	4
Portion	Small	1
	Mediun	2
	Large	3
Popularity	Untrendy	1
	Trendy	2
Quality of Ingredients	Poor Quality	1
	Inferior Quality	2
	Exceptional Quality	3
Taste	Bitter	1
	Sour	2
	Sweet	3
	Spicy	4
	Salty	5
Aesthetics	Unappetizing	1
	Appetizing	2

4. Alternative Suitability Rating

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Table 4 illustrates the evaluation of how suitable each alternative is for every criterion.

Table 4. Suitability Rating Table

Alternative	Criteria					
	C_1	C_2	C_3	C_4	C_5	C_6
'A_1'	2	2	2	2	5	2
'A_2'	2	1	2	2	5	2
'A_3'	2	1	2	2	5	2
'A_4'	2	3	2	2	4	2
'A_5'	3	2	2	2	4	1
'A_6'	1	1	1	1	3	2
'A_7'	3	3	2	3	4	2
'A_8'	3	2	1	4	4	1
'A_9'	1	2	2	2	2	1
'A_{10}'	2	1	2	1	3	1
'A_{11}'	2	2	1	1	2	1
'A_{12}'	1	1	1	2	3	2
'A_{13}'	2	1	1	2	3	1
'A_{14}'	2	2	2	2	3	2
'A_{15}'	1	2	2	2	3	2
'A_{16}'	1	1	1	2	1	1
'A_{17}'	2	2	2	1	1	1
'A_{18}'	3	3	2	2	3	2
'A_{19}'	2	2	2	2	1	1
'A_{20}'	1	3	2	1	2	1

5. Decision Matrix (X)
   The alternative suitability ratings table is transformed into the shape of a decision matrix R, which is :

$$X = \begin{bmatrix} 2 & 2 & 2 & 2 & 5 & 2 \\ 2 & 1 & 2 & 2 & 5 & 2 \\ 2 & 1 & 2 & 2 & 5 & 2 \\ 2 & 3 & 2 & 2 & 4 & 2 \\ 3 & 2 & 2 & 2 & 4 & 1 \\ 1 & 1 & 1 & 1 & 3 & 2 \\ 3 & 3 & 2 & 3 & 4 & 2 \\ 3 & 2 & 1 & 4 & 4 & 1 \\ 1 & 2 & 2 & 2 & 2 & 1 \\ 2 & 1 & 2 & 1 & 3 & 1 \\ 2 & 2 & 1 & 1 & 2 & 1 \\ 1 & 1 & 1 & 2 & 3 & 2 \\ 2 & 1 & 1 & 2 & 3 & 1 \\ 2 & 2 & 2 & 2 & 3 & 2 \\ 1 & 2 & 2 & 2 & 3 & 2 \\ 1 & 1 & 1 & 2 & 1 & 1 \\ 2 & 2 & 2 & 1 & 1 & 1 \\ 3 & 3 & 2 & 2 & 3 & 2 \\ 2 & 2 & 2 & 2 & 1 & 1 \\ 1 & 3 & 2 & 1 & 2 & 1 \end{bmatrix}$$

6. Calculating Normalization (R_{ij})
   Perform a manual normalization calculation process based on the decision matrix that has been made, namely:

Table 5. Normalization Result Table

C_1 (benefit)	C_2 (benefit)	C_3 (benefit)	C_4 (Cost)	C_5 (benefit)	C_6 (benefit)
$R_{1,1} = \frac{2}{3} = 0{,}67$	$R_{2,1} = \frac{2}{3} = 0{,}67$	$R_{3,1} = \frac{2}{2} = 1$	$R_{4,1} = \frac{1}{2} = 0{,}5$	$R_{5,1} = \frac{5}{5} = 1$	$R_{6,1} = \frac{2}{2} = 1$
$R_{1,2} = \frac{2}{3} = 0{,}67$	$R_{2,2} = \frac{1}{3} = 0{,}33$	$R_{3,2} = \frac{2}{2} = 1$	$R_{4,2} = \frac{1}{2} = 0{,}5$	$R_{5,2} = \frac{5}{5} = 1$	$R_{6,2} = \frac{2}{2} = 1$
$R_{1,3} = \frac{2}{3} = 0{,}67$	$R_{2,3} = \frac{1}{3} = 0{,}33$	$R_{3,3} = \frac{2}{2} = 1$	$R_{4,3} = \frac{1}{2} = 0{,}5$	$R_{5,3} = \frac{5}{5} = 1$	$R_{6,3} = \frac{2}{2} = 1$
$R_{1,4} = \frac{2}{3} = 0{,}67$	$R_{2,4} = \frac{3}{3} = 1$	$R_{3,4} = \frac{2}{2} = 1$	$R_{4,4} = \frac{1}{2} = 0{,}5$	$R_{5,4} = \frac{4}{5} = 0{,}8$	$R_{6,4} = \frac{2}{2} = 1$
$R_{1,5} = \frac{3}{3} = 1$	$R_{2,5} = \frac{2}{3} = 0{,}67$	$R_{3,5} = \frac{2}{2} = 1$	$R_{4,5} = \frac{1}{2} = 0{,}5$	$R_{5,5} = \frac{4}{5} = 0{,}8$	$R_{6,5} = \frac{1}{2} = 0{,}5$
$R_{1,6} = \frac{1}{3} = 0{,}33$	$R_{2,6} = \frac{1}{3} = 0{,}33$	$R_{3,6} = \frac{1}{2} = 0{,}5$	$R_{4,6} = \frac{1}{1} = 1$	$R_{5,6} = \frac{3}{5} = 0{,}6$	$R_{6,6} = \frac{2}{2} = 1$

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C_1 (benefit)	C_2 (benefit)	C_3 (benefit)	C_4 (Cost)	C_5 (benefit)	C_6 (benefit)
$R_{1,7} = \frac{3}{3} = 1$	$R_{2,7} = \frac{3}{3} = 1$	$R_{3,7} = \frac{2}{2} = 1$	$R_{4,7} = \frac{1}{3} = 0{,}33$	$R_{5,7} = \frac{4}{5} = 0{,}8$	$R_{6,7} = \frac{2}{2} = 1$
$R_{1,8} = \frac{3}{3} = 1$	$R_{2,8} = \frac{2}{3} = 0{,}67$	$R_{3,8} = \frac{1}{2} = 0{,}5$	$R_{4,8} = \frac{1}{4} = 0{,}25$	$R_{5,8} = \frac{4}{5} = 0{,}8$	$R_{6,8} = \frac{1}{2} = 0{,}5$
$R_{1,9} = \frac{1}{3} = 0{,}33$	$R_{2,9} = \frac{2}{3} = 0{,}67$	$R_{3,9} = \frac{2}{2} = 1$	$R_{4,9} = \frac{1}{2} = 0{,}5$	$R_{5,9} = \frac{2}{5} = 0{,}4$	$R_{6,9} = \frac{1}{2} = 0{,}5$
$R_{1,10} = \frac{2}{3} = 0{,}67$	$R_{2,10} = \frac{1}{3} = 0{,}33$	$R_{3,10} = \frac{2}{2} = 1$	$R_{4,10} = \frac{1}{1} = 1$	$R_{5,10} = \frac{3}{5} = 0{,}6$	$R_{6,10} = \frac{1}{2} = 0{,}5$
$R_{1,11} = \frac{2}{3} = 0{,}67$	$R_{2,11} = \frac{2}{3} = 0{,}67$	$R_{3,11} = \frac{1}{2} = 0{,}5$	$R_{4,11} = \frac{1}{1} = 1$	$R_{5,11} = \frac{2}{5} = 0{,}4$	$R_{6,11} = \frac{1}{2} = 0{,}5$
$R_{1,12} = \frac{1}{3} = 0{,}33$	$R_{2,12} = \frac{1}{3} = 0{,}33$	$R_{3,12} = \frac{1}{2} = 0{,}5$	$R_{4,12} = \frac{1}{2} = 0{,}5$	$R_{5,12} = \frac{3}{5} = 0{,}6$	$R_{6,12} = \frac{2}{2} = 1$
$R_{1,13} = \frac{2}{3} = 0{,}67$	$R_{2,13} = \frac{1}{3} = 0{,}33$	$R_{3,13} = \frac{1}{2} = 0{,}5$	$R_{4,13} = \frac{1}{2} = 0{,}5$	$R_{5,13} = \frac{3}{5} = 0{,}6$	$R_{6,13} = \frac{1}{2} = 0{,}5$
$R_{1,14} = \frac{2}{3} = 0{,}67$	$R_{2,14} = \frac{2}{3} = 0{,}67$	$R_{3,14} = \frac{2}{2} = 1$	$R_{4,14} = \frac{1}{2} = 0{,}5$	$R_{5,14} = \frac{3}{5} = 0{,}6$	$R_{6,14} = \frac{2}{2} = 1$
$R_{1,15} = \frac{1}{3} = 0{,}33$	$R_{2,15} = \frac{2}{3} = 0{,}67$	$R_{3,15} = \frac{2}{2} = 1$	$R_{4,15} = \frac{1}{2} = 0{,}5$	$R_{5,15} = \frac{3}{5} = 0{,}6$	$R_{6,15} = \frac{2}{2} = 1$
$R_{1,16} = \frac{1}{3} = 0{,}33$	$R_{2,16} = \frac{1}{3} = 0{,}33$	$R_{3,16} = \frac{1}{2} = 0{,}5$	$R_{4,16} = \frac{1}{2} = 0{,}5$	$R_{5,16} = \frac{1}{5} = 0{,}2$	$R_{6,16} = \frac{1}{2} = 0{,}5$
$R_{1,17} = \frac{2}{3} = 0{,}67$	$R_{2,17} = \frac{2}{3} = 0{,}67$	$R_{3,17} = \frac{2}{2} = 1$	$R_{4,17} = \frac{1}{1} = 1$	$R_{5,17} = \frac{1}{5} = 0{,}2$	$R_{6,17} = \frac{1}{2} = 0{,}5$
$R_{1,18} = \frac{3}{3} = 1$	$R_{2,18} = \frac{3}{3} = 1$	$R_{3,18} = \frac{2}{2} = 1$	$R_{4,18} = \frac{1}{2} = 0{,}5$	$R_{5,18} = \frac{3}{5} = 0{,}6$	$R_{6,18} = \frac{2}{2} = 1$
$R_{1,19} = \frac{2}{3} = 0{,}67$	$R_{2,19} = \frac{2}{3} = 0{,}67$	$R_{3,19} = \frac{2}{2} = 1$	$R_{4,19} = \frac{1}{2} = 0{,}5$	$R_{5,19} = \frac{1}{5} = 0{,}2$	$R_{6,19} = \frac{1}{2} = 0{,}5$
$R_{1,20} = \frac{1}{3} = 0{,}33$	$R_{2,20} = \frac{3}{3} = 1$	$R_{3,20} = \frac{2}{2} = 1$	$R_{4,20} = \frac{1}{1} = 1$	$R_{5,20} = \frac{2}{5} = 0{,}4$	$R_{6,20} = \frac{1}{2} = 0{,}5$

7. Normalization Matrix (R)
   All data that has been normalized manually is directly entered into the normalization matrix (R) as follows:

$$R = \begin{bmatrix} 0{,}67 & 0{,}67 & 1 & 0{,}5 & 1 & 1 \\ 0{,}67 & 0{,}33 & 1 & 0{,}5 & 1 & 1 \\ 0{,}67 & 0{,}33 & 1 & 0{,}5 & 1 & 1 \\ 0{,}67 & 1 & 1 & 0{,}5 & 0{,}8 & 1 \\ 1 & 0{,}67 & 1 & 0{,}5 & 0{,}8 & 0{,}5 \\ 0{,}33 & 0{,}33 & 0{,}5 & 1 & 0{,}6 & 1 \\ 1 & 1 & 1 & 0{,}33 & 0{,}8 & 1 \\ 1 & 0{,}67 & 0{,}5 & 0{,}25 & 0{,}8 & 0{,}5 \\ 0{,}33 & 0{,}67 & 1 & 0{,}5 & 0{,}4 & 0{,}5 \\ 0{,}67 & 0{,}33 & 1 & 1 & 0{,}6 & 0{,}5 \\ 0{,}67 & 0{,}67 & 0{,}5 & 1 & 0{,}4 & 0{,}5 \\ 0{,}33 & 0{,}33 & 0{,}5 & 0{,}5 & 0{,}6 & 1 \\ 0{,}67 & 0{,}33 & 0{,}5 & 0{,}5 & 0{,}6 & 0{,}5 \\ 0{,}67 & 0{,}67 & 1 & 0{,}5 & 0{,}6 & 1 \\ 0{,}33 & 0{,}67 & 1 & 0{,}5 & 0{,}6 & 1 \\ 0{,}33 & 0{,}33 & 0{,}5 & 0{,}5 & 0{,}2 & 0{,}5 \\ 0{,}67 & 0{,}67 & 1 & 1 & 0{,}2 & 0{,}5 \\ 1 & 1 & 1 & 0{,}5 & 0{,}6 & 1 \\ 0{,}67 & 0{,}67 & 1 & 0{,}5 & 0{,}2 & 0{,}5 \\ 0{,}33 & 1 & 1 & 1 & 0{,}4 & 0{,}5 \end{bmatrix}$$

8. Final Preference Value (Vi)
   Calculating the final preference value (Vi) to find out the highest value of each alternative by utilizing the following equation:

$V_1 = \sum (0{,}2)(0{,}67) + (0{,}2)(0{,}67) + (0{,}15)(1) + (0{,}2)(0{,}5) + (0{,}1)(1) + (0{,}15)(1)$
$= 0{,}133 + 0{,}133 + 0{,}15 + 0{,}1 + 0{,}1 + 0{,}15$
$= 0{,}766$
$V_2 = \sum (0{,}2)(0{,}67) + (0{,}2)(0{,}33) + (0{,}15)(1) + (0{,}2)(0{,}5) + (0{,}1)(1) + (0{,}15)(1)$
$= 0{,}133 + 0{,}067 + 0{,}15 + 0{,}1 + 0{,}1 + 0{,}15$
$= 0{,}7$
$V_3 = \sum (0{,}2)(0{,}67) + (0{,}2)(0{,}33) + (0{,}15)(1) + (0{,}2)(0{,}5) + (0{,}1)(1) + (0{,}15)(1)$
$= 0{,}133 + 0{,}067 + 0{,}15 + 0{,}1 + 0{,}1 + 0{,}15$
$= 0{,}7$
$V_4 = \sum (0{,}2)(0{,}67) + (0{,}2)(1) + (0{,}15)(1) + (0{,}2)(0{,}5) + (0{,}1)(0{,}8) + (0{,}15)(1)$
$= 0{,}133 + 0{,}2 + 0{,}15 + 0{,}1 + 0{,}08 + 0{,}15$
$= 0{,}813$
$V_5 = \sum (0{,}2)(1) + (0{,}2)(0{,}67) + (0{,}15)(1) + (0{,}2)(0{,}5) + (0{,}1)(0{,}8) + (0{,}15)(1)$
$= 0{,}2 + 0{,}133 + 0{,}15 + 0{,}1 + 0{,}08 + 0{,}075$

Journal of Information System Research (JOSH)
Volume 5, No. 1, Oktober 2023, pp 271−280
ISSN 2686-228X (media online)
https://ejurnal.seminar-id.com/index.php/josh/
DOI 10.47065/josh.v5i1.4412

= 0,738
$V_6 = \sum (0,2)(0,33) + (0,2)(0,33) + (0,15)(0,5) + (0,2)(1) + (0,1)(0,6) + (0,15)(1)$
= 0,067 + 0,067 + 0,075 + 0,2 + 0,06 + 0,15
= 0,619
$V_7 = \sum (0,2)(1) + (0,2)(1) + (0,15)(1) + (0,2)(0,33) + (0,1)(0,8) + (0,15)(1)$
= 0,2 + 0,2 + 0,15 + 0,067 + 0,08 + 0,15
= 0,847
$V_8 = \sum (0,2)(1) + (0,2)(0,67) + (0,15)(0,5) + (0,2)(0,25) + (0,1)(0,8) + (0,15)(0,5)$
= 0,2 + 0,133 + 0,075 + 0,05 + 0,08 + 0,075
= 0,613
$V_9 = \sum (0,2)(0,33) + (0,2)(0,67) + (0,15)(1) + (0,2)(0,5) + (0,1)(0,4) + (0,15)(0,5)$
= 0,067 + 0,133 + 0,15 + 0,1 + 0,04 + 0,075
= 0,565
$V_{10} = \sum (0,2)(0,67) + (0,2)(0,33) + (0,15)(1) + (0,2)(1) + (0,1)(0,6) + (0,15)(0,5)$
= 0,133 + 0,067 + 0,15 + 0,2 + 0,06 + 0,075
= 0,685
$V_{11} = \sum (0,2)(0,67) + (0,2)(0,67) + (0,15)(0,5) + (0,2)(1) + (0,1)(0,4) + (0,15)(0,5)$
= 0,133 + 0,133 + 0,075 + 0,2 + 0,04 + 0,075
= 0,656
$V_{12} = \sum (0,2)(0,33) + (0,2)(0,33) + (0,15)(0,5) + (0,2)(0,5) + (0,1)(0,6) + (0,15)(1)$
= 0,067 + 0,067 + 0,075 + 0,1 + 0,06 + 0,15
= 0,519
$V_{13} = \sum (0,2)(0,67) + (0,2)(0,33) + (0,15)(0,5) + (0,2)(0,5) + (0,1)(0,6) + (0,15)(0,5)$
= 0,133 + 0,067 + 0,075 + 0,1 + 0,06 + 0,075
= 0,51
$V_{14} = \sum (0,2)(0,67) + (0,2)(0,67) + (0,15)(1) + (0,2)(0,5) + (0,1)(0,6) + (0,15)(1)$
= 0,133 + 0,133 + 0,15 + 0,1 + 0,06 + 0,15
= 0,726
$V_{15} = \sum (0,2)(0,33) + (0,2)(0,67) + (0,15)(1) + (0,2)(0,5) + (0,1)(0,6) + (0,15)(1)$
= 0,067 + 0,133 + 0,15 + 0,1 + 0,06 + 0,15
= 0,66
$V_{16} = \sum (0,2)(0,33) + (0,2)(0,33) + (0,15)(0,5) + (0,2)(0,5) + (0,1)(0,2) + (0,15)(0,5)$
= 0,067 + 0,067 + 0,075 + 0,1 + 0,02 + 0,075
= 0,404
$V_{17} = \sum (0,2)(0,67) + (0,2)(0,67) + (0,15)(1) + (0,2)(1) + (0,1)(0,2) + (0,15)(0,5)$
= 0,133 + 0,133 + 0,15 + 0,2 + 0,02 + 0,075
= 0,711
$V_{18} = \sum (0,2)(1) + (0,2)(1) + (0,15)(1) + (0,2)(0,5) + (0,1)(0,6) + (0,15)(1)$
= 0,2 + 0,2 + 0,15 + 0,1 + 0,06 + 0,15
= 0,86
$V_{19} = \sum (0,2)(0,67) + (0,2)(0,67) + (0,15)(1) + (0,2)(0,5) + (0,1)(0,2) + (0,15)(0,5)$
= 0,133 + 0,133 + 0,15 + 0,1 + 0,02 + 0,075
= 0,611
$V_{20} = \sum (0,2)(0,33) + (0,2)(1) + (0,15)(1) + (0,2)(1) + (0,1)(0,4) + (0,15)(0,5)$
= 0,067 + 0,2 + 0,15 + 0,2 + 0,04 + 0,075
= 0,732

9. Ranking Results
After the calculation process of the final preference (Vi), the highest value to the smallest value is obtained. The values are sorted to produce a ranking of 1-20 as in table 5 below.

Table 6. Table of Ranking Results

Alternative	Menu	Result V_i	Ranking
A_{18}	Oatmeal Protein Shake	'0,86'	'1'
A_7	Pepperoni Pizza	'0,847'	'2'
A_4	Ramen Noodle	'0,813'	'3'
A_1	Alfredo Spaghetti	'0,766'	'4'
A_5	Seafood fried rice	'0,738'	'5'
A_{20}	Frozen Lemon Slushie	'0,732'	'6'
A_{14}	Pineapple Float	'0,726'	'7'
A_{17}	Cappuccino	'0,711'	'8'
A_2	Vegetarian Burger	'0,7'	'9'

Journal of Information System Research (JOSH)
Volume 5, No. 1, Oktober 2023, pp 271−280
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DOI 10.47065/josh.v5i1.4412

Alternative	Menu	Result V_i	Ranking
A_3	Chicken Wrap	'0,7'	'10'
A_{10}	Chocolate Mouse	'0,685'	'11'
A_{15}	Creamsicle Float	'0,66'	'12'
A_{11}	Mango Lasi Smoothies	'0,656'	'13'
A_6	Pannacotta	'0,619'	'14'
A_8	Porterhouse Steak	'0,613'	'15'
A_{19}	Chocolate Chip Frappuccino	'0,611'	'16'
A_9	Tomyam Noodle	'0,565'	'17'
A_{12}	Berry Sparkler	'0,519'	'18'
A_{13}	Minty Peach Cooler	'0,51'	'19'
A_{16}	Pour-Over Coffee	'0,404'	'20'

Based on the ranking results in table 6, 5 menus are obtained which are recommended and in accordance with customer preferences at the cafe, namely:

1. A_{18} = Oatmeal Protein Shake (0,86)
2. A_7 = Pepperoni Pizza (0,847)
3. A_4 = Ramen Noodle (0,813)
4. A_1 = Alfredo Spaghetti (0,766)
5. A_5 = Seafood Fried Rice (0,738)

4. CONCLUSION

The conclusion of this research implies that cafes have the potential to improve menu ordering efficiency by applying the Simple Additive Weighting (SAW) method. This method results in effectiveness to the sorting or scoring process performed and is also able to recognize menus that match customer preferences. Therefore, increasing customer satisfaction is one of the results pursued in this research. In the implementation of the Simple Additive Weighting (SAW) method, the end result is five recommended alternative menus according to customer preferences. These menus are alternative A18 with a result of 0.86 , alternative A7 with a value of 0.847, alternative A4 with a value of 0.813, alternative A1 with a value of 0.766, and finally alternative A5 with a value of 0.738.

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Journal of Information System Research (JOSH)
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