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Submission date: 29-Sep-2022 03:24PM (UTC+0700)
Submission ID: 1911966921
File name: ICCED 2021 Falen - PAPER ICCED2021-PaperID- 32 Felentino.pdf (1.9M)
Word count: 2870
Character count: 14509

Decision Support System For Best Catering Using Simple Additive Weighting Method In PT. YHS

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Abstract **- Catering is an entrepreneur who serves orders for various kinds of dishes food and drinks for parties or to support the needs of an agency. There are at least fifteen catering businesses scattered around the Cibadak sub-district, this proves that the catering business has a high level of competition. PT. YHS has more than 1,500 employees with busy production conditions, so the need for practical and ready-to-consume food for employees is very important. Since its establishment in 2007 PT. YHS has changed catering services five times, this continues to be done because management has difficulty in choosing catering services that have criteria according to employee needs, with this ready-to-eat food the problem of cleanliness has the highest risk, therefore this study aims to produce a system. decision support that can assist management in providing the best catering recommendations based on predetermined criteria using Simple Additive Weighting or SAW as a method. The basic concept of the SAW method is to find the weighted sum of the performance ratings for each alternative in all attributes. The SAW method requires a decision matrix normalization process (X) to a scale that can be compared with all available alternative ratings. The results of this study are a system that can display the value of each alternative, normalization and preference, from 9 alternative catering and 4 criteria, the highest preference value is obtained with a value of 0.768 which is used as a candidate for catering that will be selected by the company. This system uses the PHP programming language and MySQL database.**

Keywords: **Decision Support Systems, Catering, Simple Additive Weighting.**

I. INTRODUCTION

Catering industry is a business that provides food, beverages and various other services. Usually this business is aimed at special events, but some are routine day by day and this is what the company lunch suppliers are looking for the most. The scope of work of the catering industry varies widely, from small-scale scopes of a kind of boxed rice for tahlilan, to large events involving not only the provision of buffet food and beverage services, but also cutlery, linens, service personnel, and other aspects of the event. the. Catering services, especially in the Cibadak area, have spread, considering that Cibadak is an industrial area that influences the economic life of the surrounding community, catering is important for companies because of the need for practical and ready-to-consume food for employees.

Each caterer has its own advantages and disadvantages, from the difference in price and taste. Companies that use catering services must be smart in choosing which ones can benefit both parties, and the most important thing is that they are guaranteed and their quality has been tested, because of the risks that can be caused and cause food-borne diseases. With so many catering services that have sprung up, especially in the Cibadak area, it is a separate task for companies to choose catering services that are in accordance with company needs, but the process is not easy as experienced at PT. YHS, established in 2007 PT. YHS has changed catering services five times, PT. YHS is currently working with one of the catering services in the Cibadak area, one of the problems that has been faced is that the catering service cancels orders suddenly but food for employees must be provided so that the company is overwhelmed to replace the cancellation of food orders when That, another problem is that there are complaints from employees about the menu provided because it is

less varied, with the above problems the company plans to replace catering services that are better than before. Decision support systems can help provide judgment by allowing for a lot of computation to be effective and efficient. In this study, the Simple Additive Weighting method was chosen because of its advantages that it can make a more precise assessment based on the criteria and weight values, so that it can select the best alternative from a number of alternatives by carrying out the ranking process.

Implementation of Simple Additive Weighting carried out by Reza Fauzan, Yoenia Indasary and Nonik Muthia (2017) with a decision support system for receiving Bidik Misi scholarships at POLIBAN using the Web-Based SAW method. The purpose of this research is to determine the alternative recipients of Bidik Misi scholarships at Banjarmasin State Polytechnic that are closest to the predetermined criteria. Dede Syahrul Anwar, Dani Rohpandi and Indriyanti (2018) with the title Decision Support System for Determining Chili Plant Lands Using the Simple Additive Weighting Method, while the purpose of this study is to determine the land for chili plants to be used to assist farmers in determining the suitability of agricultural land for cultivation. chili plant. Handi Tamando Sitohang and Maria Santauli Siboro (2016), with the title application of problematic student decision support systems using the SAW method at Mulia Pratama Medan private junior high school, the purpose of this study is to provide information or help as an alternative solution to every student violation and error.

Based on the above problems, this study aims to produce a decision support system for selecting the best catering using the Simple Additive Weighting method which can help recommend the best catering services based on the criteria determined by the company.

II. RESEARCH METHODOLOGY

The stages in this study were to determine and identify problems, then determine methods, prepare data and research tools and materials, apply SAW and build systems, then get the results.

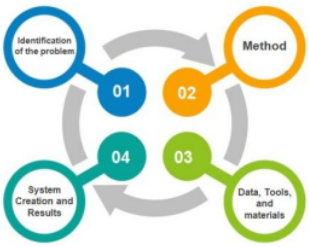

Fig. I. Research Series

A. *Identification of the problem*

Determining the problem that will be searched for a solution, namely making a decision support system for selecting the best catering using the simple additive weighting method, with the research location of PT. YHS which is located on Jl. Pioneers of independence Kp. Kebon Randu RT 001/004 Desa Sekarwangi Kec. Cibadak Kab. Sukabumi.

B. *Method*

Looking for the weighted sum of the performance ratings for each alternative in all attributes. The SAW method requires a de cision matrix normalization process (X) to a scale that can be compared with all available alternative ratings.

C. *Data*

Data collection techniques based on data sources in this study are:

- Observation, namely conducting direct observations or observations at the research location, namely PT. YHS, the restaurant that was made a candidate.
- Interview, the process of obtaining information by direct question and answer with the management of PT. YHS and restaurant employees.
- Literature study, data collection techniques by studying references in the form of data collection documents or files, books, research journals and other research sources.

D. *Tools and materials*

The system in this study uses the PHP programming language, the database uses MySQL and Visual Studio Code. SAW application and system creation, formulas of calculations using the saw coded method and this activity includes the process of writing, testing and maintaining code that builds a computer program. Results, proving that the method can provide consistent results in accordance with predetermined and well recommended criteria.

III. RESULTS AND DISCUSSION

Calculation Using the Simple Additive Weighting Method The steps for calculations is described as follows:

A. *Flow SAW method*

SAW method is needed to determine the catering services the best, the flowchart SAW are as follows:

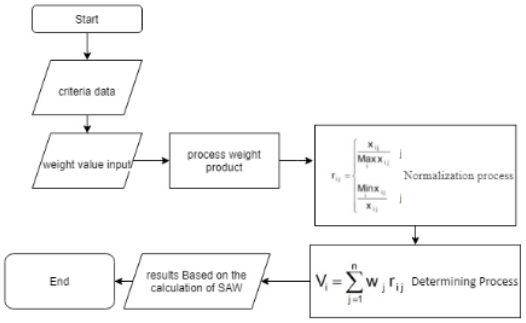

Fig. II. Flowchart SAW

Criteria in the SAW method as a basis for assessment are needed to determine who will be selected as the best caterer chosen by the company. The criteria can be seen in the following graph:

Max^{xj} : The greatest value of each criterion i

Min x^{ij} : The greatest value of each criterion j

X^{ij} : The attribute value of each performance

Benefit : If the greatest value is best

Cost : If the smallest value is best

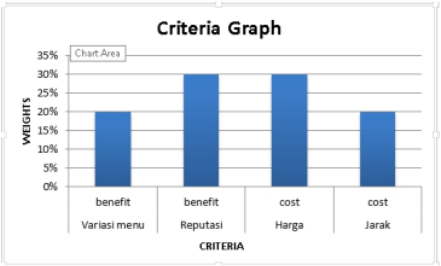

Fig. III. Criteria Graph

Catering Data, this study uses data obtained from observations to the catering location and direct interviews with catering employees following a recap in table form.

Note:

- Reputation, the time taken in years since its establishment.
- Price 10,000-20,000 = 1

  Price 20,000-30,000 = 2

  Price 30,000-40,000 = 3
- Distance, the length of the route taken from the catering location to PT. YHS in units of kilo meter distance

TABLE II. Data Recap Catering

ID RM	Catering	Menu Variants	Repu - tatio n	Pri ce	Dista nce
21001	Kang Yana	3	11	2	4
21002	Cie Yeni	2	12	2	3
21003	Mekar Alam	2	8	1	1
21004	Rm Unin	5	5	1	1
21005	Tanjakan Kuring	7	4	3	3
21006	Rm Mata Air	4	3	1	3
21007	Rm Cibadak Raya	5	5	1	2
21008	Rm Elis	3	6	2	1
21009	Rm Bu Gendut	2	8	2	4

B. Determine which will be the benefits and costs.

The *benefit* criteria are menu variants (C1) and reputation (C2), for the greater the benefit value, the assessment will be of good value, while the *cost* is the price (C3) and distance (C4) for the value *cost* the greater the value the worse.

C. Normalization

Then the value normalization is carried out. To normalize the value, if the factor criteria of *benefit* to use the formula:

$$Rij = \frac{xij}{Max\ xij}$$ If j is the criterion of proft (benefit) (1)

Factors criteria of cost to use the formula:

$$Rij = \frac{Min\ xij}{xij}$$ If j is the criterion of cost (cost) (2)

Where Rij is the normalized performance rating of alternative Ai, on attributes Cj: 1, 2……, m and j = 1,2…, n. Description:

In column C1 the maximum value is 7, then each row of column C1 is divided by the maximum value of column C1, for example the calculation is in 21001 as follows:

$$R_1 = \frac{3}{7} = 0.43$$

From column C2 the maximum value is 60, then each row of C2 column is divided by the maximum value of column C2

$$R_2 = \frac{12}{11} = 0.92$$

From column C3 minimum value is 1, then each row of column C3 into the denominator of the maximum value of the column C3

$$R_3 = \frac{1}{2} = 0.5$$

From column C4 The minimum value is 1, then each row of column C4 becomes the denominator of the maximum value of column C4

$$R_4 = \frac{1}{4} = 0.25.$$

Enter all the results of these calculations into the table which this time is called the normalized factor table.

TABLE III. Normalized Factors

ID RM	Catering	Menu Variants	Repu-tation	Price	Dista nce
21001	Kang Yana	0.43	0.92	0.50	0.25
21002	Cie Yeni	0.29	1.00	0.50	0.33
21003	Mekar Alam	0.29	0.67	1.00	1.00
21004	Rm Unin	0.71	0.42	1.00	1.00
21005	Tanjakan Kuring	1.00	0.33	0.33	0.33
21006	Rm Mata Air	0.57	0.25	1.00	0.33
21007	Rm Cibadak Raya	0.71	0.42	1.00	0.50
21008	Rm Elis	0.43	0.50	0.50	1.00
21009	Rm Bu Gendut	0.29	0.67	0.50	0.25

D. Determining

The preference value after getting the table above then multiplying each column in the table by the weight of the predetermined criteria. The formula is as follows:

$$Ai = \sum_{j=i}^{n} wj\ rij\ rij \qquad (3)$$

Note:

V^i :Rank for each alternative

W^j :Weight value (Rangking of each criterion)

R^{ij} : Work rating value

(Dicky Nofriansyah, 2014:12)

Example of calculation as follows:

(0.43X0.20) + (0.92 + 0.30) + (0.50 + 0.30) + (0.25 + 0.20) = 0.561

TABLE IV. The Ranking Table

ID RM	Catering	Preference	Rangking

21001	Kang Yana	0.561	6
21002	Cie Yeni	0.574	5
21003	Mekar Alam	0.757	2
21004	Rm Unin	0.768	1
21005	Tanjakan Kuring	0.467	8
21006	Rm Mata Air	0.556	7
21007	Rm Cibadak Raya	0.668	3
21008	Rm Elis	0.586	4
21009	Rm Bu Gendut	0.457	9

E. System Design

Use case diagram describes user access to the system, that is, the user can add and change alternatives, criteria and see the ranking results, here the user as admin can only log in to the system.

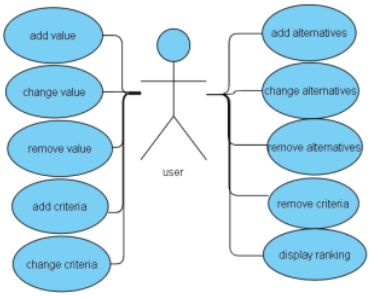

Fig. III. Use Case Diagram

F. Design Class Diagram

Design class diagram shows that the decision support system for selecting the best catering has user tables, restaurant tables, restaurant data tables, criteria tables and restaurant ranking tables.

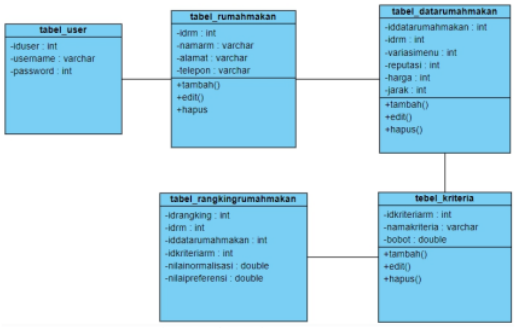

Fig.IV. Class Diagram

G. Design Entity Relationship Diagram

Fig.V. Entity Relationship Diagram

In the ERD design, it describes the Entity part which has attributes that are related to other entities.

1) In the user entity it contains the user id which has the following attributes:
   a) Username
   b) Password
2) In the restaurant entity it contains Idrm which has the attributecontains the idrm
   a) Namarm
   b) Address
   c) Phone
3) On the data entity the restaurantdata for the restaurant and the idrm which has atirbut:
   a) Menu Variations
   b) Reputation
   c) Price
   d) Distance
4) On the entity Kriteriarm contains the id criteria that have attributes:
   a) Name criteria
   b) Weight
5) In the restaurant entity ranking contains id rankingm, idrm, iddatarumahmakan and id criteria, the calculation process take place on this entity, which have attributes:
   a) Normalization
   b) Ranking value

H. Implementation of Restaurant System

1)Data Page

Fig. VI. Restaurant Data Pages Restaurant

2)Data Value Pages

Fig. VII. Restaurant Data Value

3) Criteria Pages

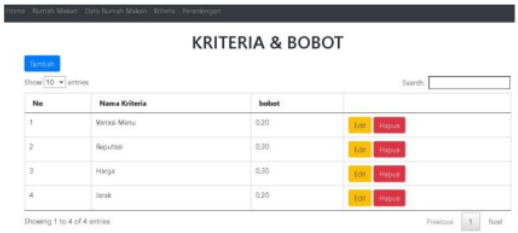

Fig. VIII. Criteria

4) Ranking Pages

Fig. IX. Ranking Pages

Can we know in Fig.IV RM Unin has the highest preference value with a value of 0.768 being the strongest candidate as the best caterer that will be chosen by PT. YHS, to be able to see the comparison of preference values between alternatives can be seen in the following graphic image:

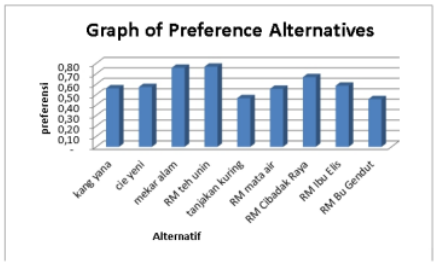

Fig. X. Graph of Preference Alternatives

I. CONCLUSION

Based on the research results, it can be concluded that;

1) Criteria chosen in this study were
   - Menu variations, the more A large variety of menus will be better at increasing employee appetite, and minimizing food waste.
   - The old reputation of an organization that defines the level of public trust in the organization is getting higher.
   - Affordable prices for companies
   - Distance, the farther the distance between the catering location and PT. YHS, the greater the shipping costs that are spent.
2) From the calculation using the Simple Additive Weighting method, it is found that the alternative with the highest preference value is the Unin Restaurant with a value of 0.768.
3) Based on calculations using the Simple Additive Weighting method, this decision support system is able to perform calculations in accordance with the criteria and weighting to produce a system that can display the preference value of each alternative used as decision support material in determining the best catering.

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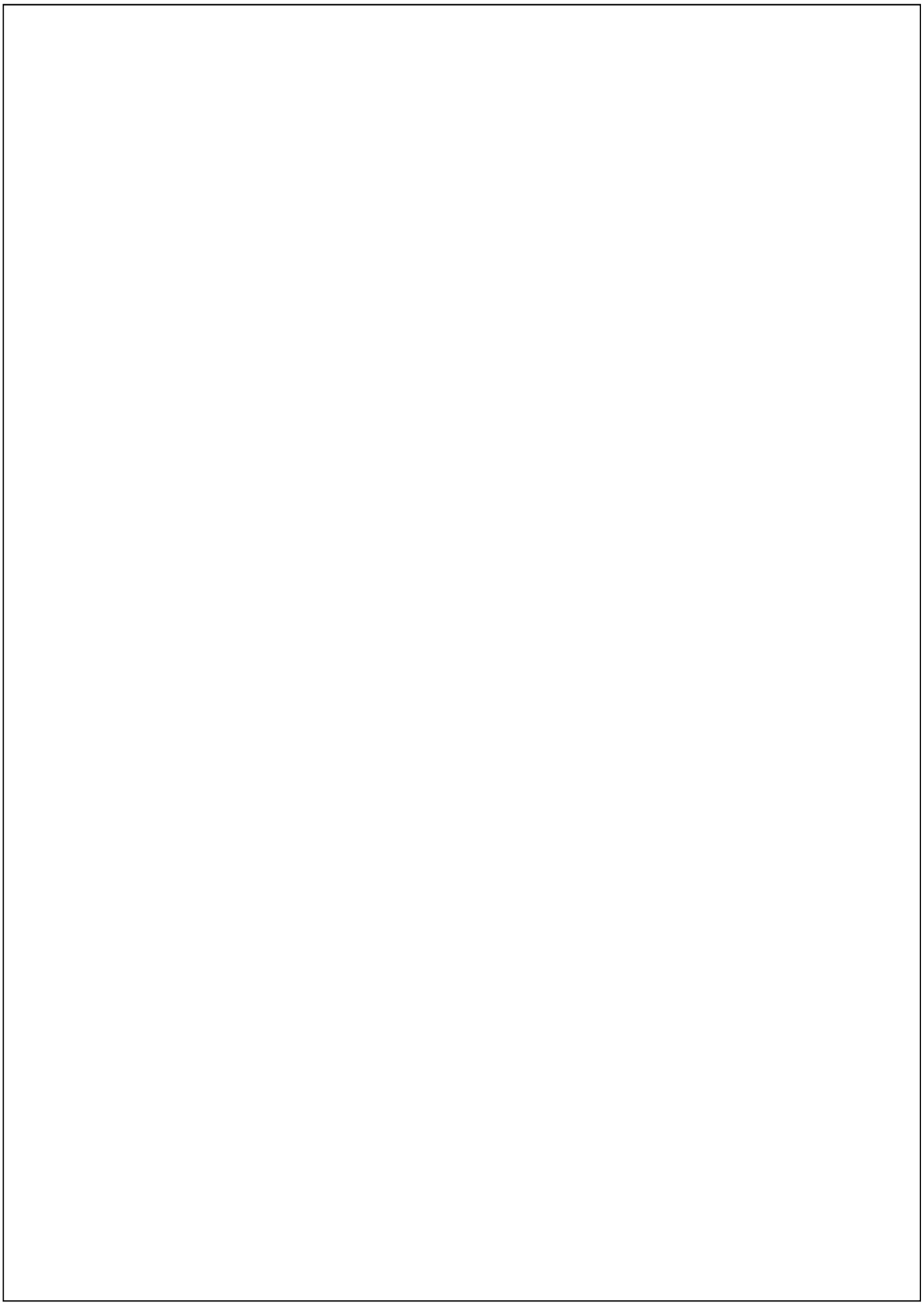

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