Decision Support System for Wedding Package Using Multi-Objective Optimization of Ratio Analysis Method

Indah Fitri Astuti *
Informatic, Mulawarman University
Samarinda, 75119, Indonesia
indahfitriastuti@unmul.ac.id
Corresponding author

Awang Harsa Kridalaksana
Informatic, Mulawarman University
Samarinda, 75119, Indonesia
awanghk@unmul.ac.id

Rasni Alex
Informatic, Mulawarman University
Samarinda, 75119, Indonesia
rasnialex@ft.unmul.ac.id

Dewi Fitri
Informatic, Mulawarman University
Samarinda, 75119, Indonesia
dewifitri@gmail.com

Dedy Cahyadi
Informatic, Mulawarman University
Samarinda, 75119, Indonesia
dedy.cahyadi@gmail.com

Aulia Khoirunnita
Informatic, Mulawarman University
Samarinda, 75119, Indonesia
auliakhoirunnita@unmul.ac.id

Abstract – Some of the problems in preparing a wedding day are determining the venue, event concept, concept and others are very time-consuming. Wedding organizers are an option to overcome these problems, one of the wedding organizers in Samarinda is Galeri Shella, which has various wedding packages with facilities and prices, making it difficult for brides-to-be. To make it easier to make the right wedding package decision, a decision support system is made. The decision aims to provide wedding package recommendations with criteria that can be chosen by the bride and groom and their budget. The method used in this system is Multi-Objective Optimization of Ratio Analysis (MOORA) using six criteria catering, venue, decoration, documentation, makeup and price, as a reference calculation that can produce the best wedding package recommendations according to the wishes of the bride and groom. The research results obtained show that the system functions very well, is easy to use, and makes it easier for brides to choose wedding packages. From the results of accuracy testing, it is known that the results of manual calculations and the system make no difference, and this study obtained an accuracy value of 100%.

Keywords—Decision Support System, Wedding Organizer, MOORA, Wedding Package, Bride.

I. INTRODUCTION

Marriage is a special ceremony in which two individuals make pledges to one another in front of their parents and headman, which are then recognized by religious law, state law, and customary law. Marriage may also be seen as the second-most important aspect of the occasion.

Problems often in preparing for a wedding are determining the venue, concept and others will take a lot of time and energy for the bride. Along with the development of time, service providers for weddings called wedding organizers are an option to provide solutions to these problems.

A wedding organizer is an organization that provides various facilities for wedding events such as decoration, documentation and arranging from the beginning of the preparation of the event until the event is completed. The process of offering this service is tailored to the wishes and needs of the bride and groom (Puspa et al., 2019). Through social media such as Instagram, prospective brides can see the portfolios of several wedding organizers available in Samarinda.

Several factors must be considered, including the vendors incorporated and the prices given. Galeri Shella is one of the wedding organizers in Samarinda, which has several packages consisting of catering, decoration, documentation, makeup, wedding organizer and others with different package prices according to the needs of prospective brides.

From Galeri Shella, there are obstacles, namely ordering wedding packages carried out manually, prospective brides must come to the gallery or semi-manually using the chat application. Promotion is still carried out through brochures at wedding exhibitions and digital promotion media only through Instagram.

To support the stages of decision-making, including problem identification, selection of data, approach determinations, and evaluation of the selection of alternatives, a decision support system concept is required. Its fundamental objective is to help management make wise judgments about structured and semi-structured challenges (Na'am, 2017).

The objective of this study is to apply the Multi-Objective Optimization by Ratio Analysis (MOORA) method to a system developed as a reference for ranking results to produce the best recommendations for prospective brides based on the criteria, values, and available budget, as well as to facilitate business offering of services and ordering process.

According to the criteria and budget values that are determined using the MOORA calculation, this system can

create the best recommendations for the bride and groom and make it simpler for businesses to offer their services and the purchasing procedure.

II. LITERATUR STUDY

A. Wedding Organizer

According to (Aman &; Suroso, 2021), some brides-to-be and families are busy and do not want to bother preparing for their wedding so they use the services of *a wedding organizer*. By using this service, the bride and groom have no difficulty getting information related to the wedding such as makeup, decorations, documentation and others.

B. Decision Support System

According to (Yuliyanti et al., 2018), Michael S. Scott Morton used the term Management Decision System in the early 1970s to describe the Decision Support System (DSS). This computer-based system assists decision-makers by utilizing specific data and models to tackle various situations.

According to (Robith Adani, 2021), decision support systems are computer-based information systems used to support decision-making in a company or organization. DSS is also often said to be a computer system that helps manage data into information that can solve problems and provide the right decisions. The stages of the process in DSS consist of 4 steps, namely:

1. *Intelligence* is a tracing process to map problems and recognize problems.
2. *Design, namely the process of* developing the search for the right alternative solution to be taken and carrying out a verification and validation process to find out the accurate level of the method studied.
3. *Choice* is to choose various alternative solutions that can be chosen and raised in the planning phase by considering criteria based on the main objectives (objectives).
4. Implementation, which is adjusting the system design that has been made in the previous phase.

C. Multi-Objective Optimization of Ratio Analysis (MOORA)

According to (Astuti &; Saragih, 2020), for resolving issues with difficult mathematical computations, employ the MOORA approach. Because it is flexible and simple to divide subjective assessment processes into weight criteria with a variety of decision-making features, the MOORA technique is simple to grasp.

According to (Ilham &; Parlina, 2019), the MOORA method is introduced by Braurers and Zavadkas (2006). This method has good selectivity and can produce the best decisions from conflicting goals and criteria, namely, benefit and cost. The following are the steps in the MOORA method (1)

Step 1: Create a decision matrix
Step 2: Normalize

$$x^*ij = \frac{Xij}{\sqrt{\sum_{j=1}^{m} Xij^2}} \qquad (1)$$

Where (1)
Xij : Alternative matrix j with criterion i
i : 1,2,3, ... n is the initialization of the sequence of criteria or attributes
j : 1,2,3... is the initialization of an alternate sequence.
x*ij : Alternative normalization matrix j with criterion i
Step 3: Calculating the value of Y1 (2)

$$yi = \sum_{j=1}^{g} WjX^*ij - \sum_{j=g+1}^{n} WjX^*ij \qquad (2)$$

Where (2)
I: 1,2,3, ... g is the maximum criterion or attribute
A: G+1, G+2, G+3, ... n is the minimum criterion or attribute
WJ: Alternate Weight Value J
yi: Normalized assessment value of alternative j against all attributes
Step 4: Ranking, based on the results of yi calculations, where the highest yi value is the best alternative marker, while the alternative with the lowest yi value is the worst alternative.

D. Hypertext Preprocessor (PHP)

According to (Febriyani, 2022), PHP is an easy and simple scripting language. At first, PHP only worked on the Linux environment, because PHP is a derivative of the PERL language created for Linux and Unix. PHP was invented by Rasmus Lerdrof in 1994 with the meaning of Home Page Tools. PHP is used to create dynamic website coding to update the website on time.

E. MySQL

According to (Fitria2), 2021), MySQL is a free data storage medium or database that enables scripts, PHP, MySQL, which offers basic queries or SQL (Structured Query Language). For the time being, MySQL is the quickest database. MySQL can accept and deliver data fast by utilizing well-known SQL instructions, which are utilized by over 6 million users globally.

F. Flowchart

According to (Shamsiah, 2019), flowchart is a chart (chart) that logically controls the flow (flow) in a system method or software. A flowchart is a visual representation of the processes of issue resolution that uses simple symbols. A flowchart's objective is to express a stage of issue resolution in a clear, deconstructed, and clean manner using standard symbols that programmers can comprehend.

III. METHODOLOGY

The stages of this research implementation are structured to build a decision support system using the MOORA method.

A. Flowchart

Figure 1 is a client flowchart, starting with the main page containing the Galeri Shella portfolio, and then the client can give a weight value to each criterion. The weight of alternative values subtracts the value. The reduced value is arranged into a matrix, then the normalization process. The matrix is normalized weight, and the package recommendation decision results according to the rank and finish.
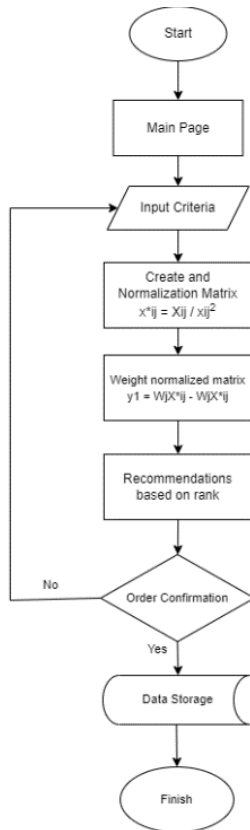

Figure 1. Client Flowchart

Figure 2 is an admin flowchart; starting with the login, the admin enters a predetermined username and password. After successfully logging into the main page, the admin can manage alternative data, criteria data, and alternative values and see MOORA calculation steps. Then the admin can manage the booker data and finish.
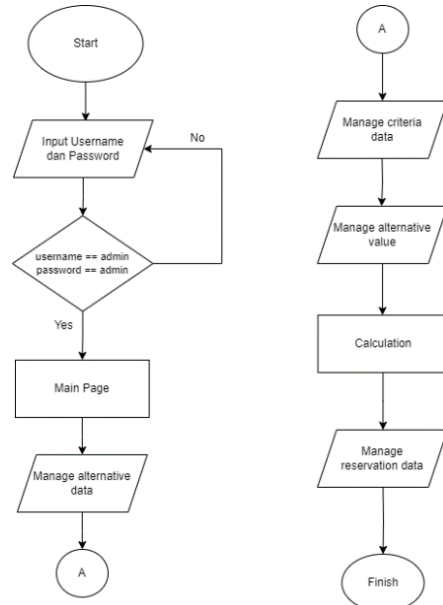

Figure 2. Admin Flowchart

B. Data Design

This system used ten alternative data in Table 1. The data was obtained from an interview with Febi, the admin of Galeri Shella.

Table 1 Alternative Data

Alternative	Information
A1	Wedding Packages
A2	Full Wedding Package s
A3	Special Packages
A4	House Packages
A5	House Wedding Packages
A6	Wedding Packages Under the Tent
A7	Building Packages
A8	Building Wedding Packages
A9	Wedding & Reception Packages
A10	Large Building Packages

Table 2 has data on criteria, weights and types of criteria that have been determined.

Table 2. Criteria Data

Code	Criteria	Value	Sub-Criteria	Weight	Type
C1	Catering	20%	1000 pcs	10	Benefit
			1200 pcs	20	
			1500 pcs	30	
C2	Venue	20%	Home	10	Benefit
			Tent	20	
			Building	30	
C3	Decoration	10%	Not Critical	10	Benefit
			Critical	20	
			Very Critical	30	
C4	Documentation	10%	Not Critical	10	Benefit
			Critical	20	
			Very Critical	30	
C5	Makeup	10%	Not Critical	10	Benefit
			Critical	20	
			Very Critical	30	
C6	Prices	30%	< Rp. 45.000.000	10	Benefit
			Rp. 45.000.000	20	
			> Rp. 45.000.000	30	

IV.RESULTS AND DISCUSSION

A. *The calculation process method used is Multi-Objective Optimization of Ratio Analysis (MOORA).*

    1. Matrix Creation

        Table 3 is an implementation process that will be carried out, the calculation uses 10 samples of wedding package data available in Galeri Shella.

Table 3. Matrix Creation

Alternative	C1	C2	C3	C4	C5	C6
A1	10	10	10	10	10	10
A2	10	10	20	20	20	10
A3	10	30	20	20	20	10
A4	10	10	30	30	30	10
A5	20	10	20	20	10	10
A6	10	20	10	10	10	20
A7	10	30	20	20	20	30
A8	20	20	20	10	30	30
A9	20	30	20	20	20	30
A10	30	30	30	30	30	30

    2. Normalize Matrix

        Table 4 is a normalizing matrix by using equation formula (1), the elements of the first column are divided by the root result of summing the squares of the first column then the calculation results are entered into the matrix.

Table 4. Normalize Matrix

No	Alternative	C1	C2	C3	C4	C5	C6
1	A1	0.1924	0.1443	0.15075	0.1561737	0.1474419	0.1490
2	A2	0.1924	0.1443	0.30151	0.3123475	0.2948839	0.1490
3	A3	0.1924	0.1443	0.30151	0.3123475	0.2948839	0.1490
4	A4	0.1924	0.1443	0.4522	0.4685212	0.4423258	0.1490
5	A5	0.3849	0.1443	0.30151	0.3123475	0.1474419	0.1490
6	A6	0.1924	0.2886	0.15075	0.1561737	0.1474419	0.2981
7	A7	0.1924	0.1443	0.30151	0.3123475	0.2948839	0.4472
8	A8	0.3849	0.2886	0.30151	0.1561737	0.4423258	0.4472
9	A9	0.3849	0.1443	0.30151	0.3123475	0.2948839	0.4472
10	A10	0.5773	0.4330	0.4522	0.4685212	0.4423258	0.4472

Next step in Table 5, determine the weighted normalization matrix. Each number in the columns and rows of the normalization matrix is multiplied by the weight of each criterion that has been determined.

Table 5. Weight Normalized Matrix

Alternative	C1	C2	C3	C4	C5	C6
A1	3.849001795	2.886751346	1.507556723	1.561738	1.474419562	4.472136
A2	3.849001795	2.886751346	3.015113446	3.123475	2.948839123	4.472136
A3	3.849001795	8.660254038	3.015113446	3.123475	2.948839123	4.472136
A4	3.849001795	2.886751346	4.522670169	4.685213	4.423258685	4.472136
A5	7.698003589	2.886751346	3.015113446	3.123475	1.474419562	4.472136
A6	3.849001795	5.773502692	1.507556723	1.561738	1.474419562	8.944272
A7	3.849001795	8.660254038	3.015113446	3.123475	2.948839123	13.41641
A8	7.698003589	5.773502692	3.015113446	1.561738	4.423258685	13.41641
A9	7.698003589	8.660254038	3.015113446	3.123475	2.948839123	13.41641
A10	11.54700538	8.660254038	4.522670169	4.685213	4.423258685	13.41641

    3. Calculating the value of Y1

        Using equation (2), the value of Y1 is obtained by adding each maximum value benefit that is alternative C1, C2, C3, C4, C5 and then subtracting the minimum value cost, alternative C6 to get the value of Y1.

    4. Ranking

        Table 6 is the result of the Y1 calculation which consists of adding the maximum and minimum values of each alternative, then the two values are subtracted and produce the total final value that can produce wedding package recommendations based on the highest to lowest ranks.

Table 6. Ranking

Alternative	Max	Min	Total	Rank
A1	11.27947	4.472136	6.807331089	9
A2	15.82318	4.472136	11.35104499	6
A3	21.59668	4.472136	17.12454768	2
A4	20.36689	4.472136	15.8947589	3
A5	18.19776	4.472136	13.72562723	4
A6	14.16622	13.41641	0.749810525	10
A7	21.59668	13.41641	8.180275774	8
A8	22.47162	13.41641	9.055208165	7
A9	25.44569	13.41641	12.02927757	5
A10	33.8384	13.41641	20.42199327	1

B. Main Page

In Figure 3, the main page contains the Galeri Shella portfolio and a list of available wedding packages.

Figure 3. Main Page

C. Recommendation Page

In Figure 4, the recommendation page is a page for clients to contain the value of each criterion that the bride and groom can select. After all, the criteria have been filled in; the system will display the calculation results using MOORA, which will display the best alternative data that match the entered criteria values.
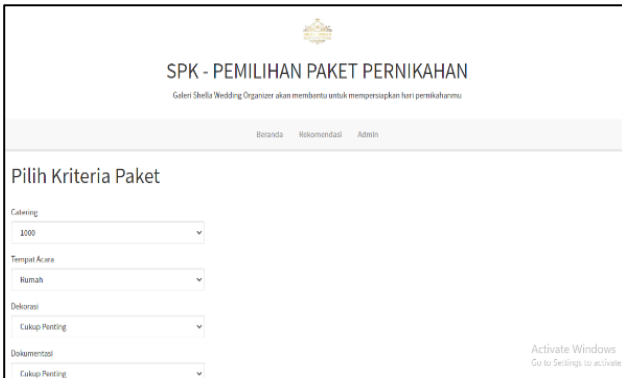

Figure 4. Recommendation Page

D. Bride Form

In Figure 5, the bride's form is a page for a client to fill in personal data such as name, mobile number, selected package and date of the event. After the data is entered, pressing the save button then, the data is saved into the database. If the bride does not want to book and wants to count recommendations again, she can press the back button to return to the recommendation page.
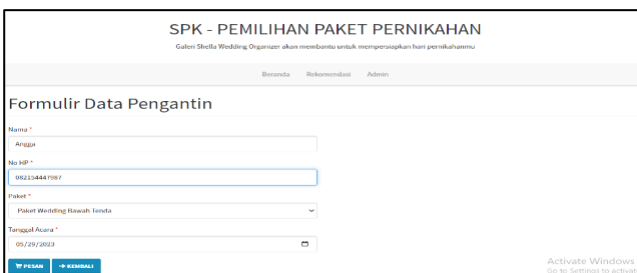
Figure 5. Bride Form Page

E. Login Admin Page

In Figure 6, the login page is a page for the admin to log in using a username and password.
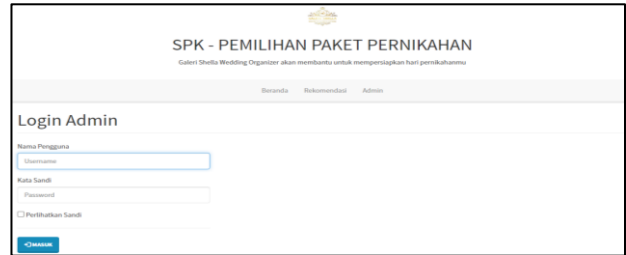
Figure 6. Login Admin Page

G. Alternative Page

In Figure 7, the alternative page for admins to manage alternative data, admins can view, change, delete existing data on the system.
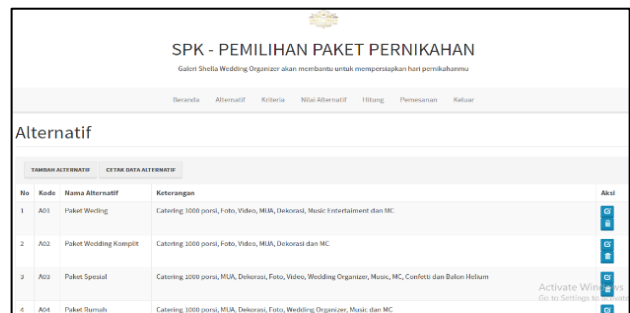
Figure 7. Alternative Page

H. Criteria Page

In Figure 8, alternative page for admins to manage alternative data. Admin can view, change, delete existing data on the system.
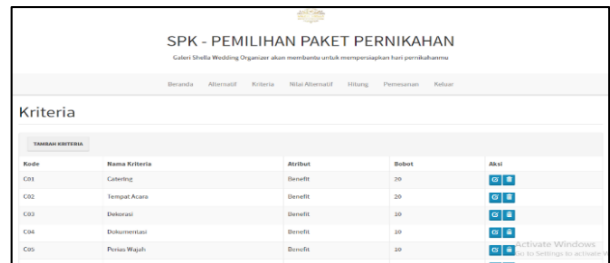

Figure 8. Criteria Page

I. Alternative Value Page

In Figure 9, alternative Value Page for the admin to manage alternative data. Admin can view, change data on the system.

Figure 9. Alternative Value Page

J. Calculation Page

In Figure 10, the calculation page for admins to view the calculation of available alternative data using the MOORA method and the highest to lowest alternative ranking results.

Figure 10. Calculation Page

K. Reservation Page

In Figure 11, reservation page for admins to manage reservation data. Admin can view, change and delete existing data on the system.

Figure 11. Reservation Page

V. CONCLUSION

This research produces a decision support system for choosing wedding packages that can provide package recommendations that match the criteria desired by the client. The system uses the *Multi-Objective Optimization of Ratio Analysis* (MOORA) method, which ranks each wedding package from lowest to highest.

Based on the tests carried out, the results of manual calculations and the system have the same total value and rating. However, this system has some shortcomings. Therefore, it is expected that future research can improve existing shortcomings by adding payment features to make it easier for *clients* to complete the booking of the selected wedding package and setting the maximum number of dates that cannot be booked because it is fully booked.

REFERENCES

Safe, M., &; Suroso. (2021). System Development Wedding Organizer Information uses an object-oriented system approach on CV Wedding Party Organizer. *Journal of Janitra Informatics and Information Systems*, *1*(1), 47–60. https://doi.org/10.25008/janitra.v1i1.119

Astuti, E., &; Saragih, N. E. (2020). Decision support system for selecting the best school with the Moora method. *Scientific Journal of Informatics*, *8*(02), 136–140. https://doi.org/10.33884/jif.v8i02.1984

Febriyani, S. (2022). *Getting to Know PHP – History, Terms, Functions, &; How It Works*. www.aksaradata.id

Fitria2), T. M. (2021). FST PSU Bekasi. *Journal of SIMANTIC Informatics*, *6*(1), 12–16.

Ilham, M., &; Parlina, et al. (2019). *InfoTekJar : National Journal of Informatics and TechnologyNetwork Decision Support System for the Selection of Favorite Public High School in Pematangsiantar City Using the MOORA Method*. 2, 0–4.

Na'am, J. (2017). A Review of the Use of the Analythic]Hierarchy Process (AHP) Method in the Decision Support System (SPK) in an Indonesian Language Journal. *Journal of Mediasisfo*, *11*(1978–8126), 888–895.

Puspa, I., Widayati, S., Information, S., &; Sti, S. J. (2019). Implementation of Simple Additive Weighting Method in Web-Based Wedding Organizing Decision Support System application. *Computational Scientific Journal*, *18*(2), 171–176. https://doi.org/10.32409/jikstik.18.2.2586

Robith Adani, M. (2021). *Application of Decision Support System (DSS) in InforRobith Technology Adani, M. (2021). Application of Decision Support System (DSS) in Information Technology*.

Shamsiah, S. (2019). Flowchart and Pseudocode Design Learning to Know Numbers with Animation for PAUD Rambutan Children. *STRING (Technological Research and Innovation Writing Unit)*, *4*(1), 86. https://doi.org/10.30998/string.v4i1.3623

Yuliyanti, S., Pradana, D., &; Somantri, A. U. (2018). Decision Support System for Determining Prospective Permanent Employees Using the SMART Method Case Study : PT . Ajinomoto. *Journal of Information and Communication Technology*, *7*(1), 49–67.