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Utilization of the Multi Attribute Utility Theory (MAUT) Method in Determining Wedding Halls in Medan City

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ABSTRACT

The building is an important part of the wedding ceremony. Especially if the event owner does not have sufficient land. So far, it's been difficult for the community to decide which wedding hall they want. Both in terms of location, building design, rental prices etc. The purpose of this research is to apply the Multi Attribute Utility Theory (MAUT) method to recommend building rental services. The criteria used to select a building are location, price, facilities, parking space capacity, and number of guests. The alternatives used are Adi Mulia Hotel Medan, Caffe Bel Mondo Medan, Andaliman Hall, Aceh Sepakat, Al-amjad Convention Hall, Wisma Mahina Center, Mutiara Suara Nafiti Convention Hall, Namaken Hall, Al-Maruf Multipurpose Building, and the Dharma Wanita Petisah Building. The results of applying the MAUT method show that the Al-Amjad Convention Hall is most recommended as the building that best fits the given criteria.

Keyword : Wedding Hall; Multi Attribute Utility Theory; MAUT;

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1. INTRODUCTION

The building is an important part of an event, especially a wedding. Especially if the event owner does not have adequate land for the event. So far, people have difficulty determining the wedding hall that they want. Both in terms of location, building design, rental prices etc. In the city of Medan there are many buildings that can be rented for weddings. However, the absence of an adequate information platform makes it difficult for the community to make the right choice of building. The purpose of this study is to apply the Multi Attribute Utility Theory (MAUT) method for building rental service recommendations. This method is used to combine measurements of different costs, risks and benefits (Aldo, 2019). So that the results are obtained according to or at least close to the wishes of the user.

The application of the Multi Attribute Utility Theory (MAUT) method has also been used in research conducted by Sari & Hayati in 2019. This research is entitled "Application of the Multi Attribute Utility Theory (MAUT) Method in Choosing Boarding Houses". This research discusses the application of the Multi Attribute Utility Theory method for selecting boarding houses that best suit the wishes of the user. Another research was conducted by Safitri and friends in 2021 entitled "Decision Support System for Buying a New Car Using the Multi Attribute Utility Theory (Maut) Method". This study applies the Multi Attribute Utility Theory method as a decision support system for determining the purchase of a new car that fits the criteria of the buyer's dream car. Pantatu has also carried out another study in 2022 entitled "Decision Support System for MSME Assistance Recipients Using the MAUT Method". This study discusses the application of the Multi Attribute Utility Theory method to support decisions in determining which UMKM are most deserving of assistance.

Based on previous studies, researchers also used the MAUT method to solve the problem of choosing a wedding hall. The Death method is used to convert several interests into numerical values on a scale of 0-1 with 0 representing the worst choice and 1 being the best. This allows direct comparisons of various sizes (Novri, 2018).

In this study, the authors used several criteria, each of which had certain sub-criteria. The criteria used to select buildings are locations with sub-criteria easy to reach, difficult to reach, and very

difficult to reach. Furthermore, the price criteria with sub criteria range from 10 to 15 million to 40 million rupiah. There are also facility criteria which include very complete, complete, sufficient, lacking, and very incomplete facilities. Parking space capacity is also used as an important criterion in this study. Starting from parking lots with a capacity of 50 to 100 vehicles or a capacity of up to 200 vehicles. The capacity of the number of guests is also used as a criterion, where the building chosen must be able to accommodate the number of guests invited.

While the alternatives used are 10 alternatives. The buildings that are used as alternatives are buildings that are usually used as venues for various events, especially in the city of Medan. These buildings are the Adi Mulia Medan Hotel, Caffe Bel Mondo Medan, Andaliman Hall, Aceh Sepakat, Al-Amjad Convention Hall, Wisma Mahina Center, Mutiara Suara Nafiti Convention Hall, Namaken Hall, Al-Maruf Multipurpose Building, and the Dharma Wanita Petisah Building.

Based on above problems that have been explained, the authors try to conduct research with the title " Utilization of the Multi Attribute Utility Theory (MAUT) Method in Determining Wedding Halls in Medan City "

2. RESEARCH METHOD

Multi Attribute Utility Theory (MAUT) is used to change from several interests into numerical values with a scale of 0-1 with 0 representing the worst choice and 1 being the best. This allows direct comparison of various values with precision. The end result is a ranking order of alternative evaluations that describes the choices of decision makers.

The steps in the Multi Attribute Utility Theory (MAUT) process are as follows:

1. Create a decision framework, by defining the problem.
2. Generate alternatives that might solve the problem.
3. Make a list (list) of all aspects that influence the decision.
4. Give weight to each existing aspect. The weights should reflect how important these aspects are to the problem.
5. Also give the weight of the existing alternatives. For each alternative, determine how satisfactory the alternative is in terms of each aspect.
6. The process of evaluating each alternative on existing aspects to make a decision. For the calculation, the formula is used:

$$V(x) = \sum_{i=1}^{n} WiVi(x) \quad (1)$$

Where v (x) is the evaluation value of the i object and wi is the weight that determines the value of how important the i element is to other elements. And n is the number of elements. Total of element is 1.

$$\sum_{i=1}^{n} Wi = 1 \quad (2)$$

For each dimension, evaluate the value of vi(x) defined as the sum of those relevant attributes.

$$Vi(x) = \sum_{e=Ai} Wai.Vai\big(I(a)\big) \quad (3)$$

There are stages in which to implement the Multi-Attribute Utility Theory (MAUT) method which will later be implemented into a program code, some of these stages include: [2]

1. Break down a decision into different dimensions.
2. Determine the relative weight on each dimension.
3. List all alternatives.
4. Enter the utility for each alternative according to its attributes.

$$U(x) = \frac{(x - Xi)}{xi^{+} - x^{-}} \quad (4)$$

5. Multiply the utility by the weight to find the value of each alternative.

3. RESULTS AND DISCUSSION

After this research was carried out, the next step was to show the results of the research. The method that has been designed consists of several steps that have their respective functions. The steps are as follows. The first step in using the Multi Attribute Utility Theory (MAUT) method is to assign a weight value to each criteria. The criteria for determining of The Wedding Hall can be made in table 1 below:

Table 1. Criteria of The Wedding Hall

Code	Criteria	Value Category
C01	Location	0,15
C02	Price	0,25
C03	Facility	0,15
C04	Parking Area	0,25
C05	Guests	0,20
Total		1

The next step is to determine the sub-criteria from the criteria for the wedding hall in table 1. Then determine the value of each sub-criteria. These sub criteria can be seen in the table below:

Table 2. Sub Criteria of Location

Name Of Assesment	Weight Criteria
Easy to find	1
Hard to find	0,7
Very hard to find	0,5

The sub–criteria for location of the wedding hall consists of 3 assessments. The location of the building is easy to find, hard to find and last is very hard to find. The following table contains the sub-criteria for determining the price of rent from the wedding hall. These sub criteria can be seen in the table below:

Table 3. Sub Criteria of Price

Name Of Assesment	Weight Criteria
10 to 15 million	1
15 to 30 million	0,8
30 to 40 million	0,5
➢ 40 million	0,4

The sub–criteria for Price of the wedding hall consists of 4 assessments. The Price of the building is around 10 to 15 million, 15 to 30 million, 30 to 40 million and last assessments is more than 40 million. The following table contains the sub-criteria for determining the Facility of the wedding hall. These sub criteria can be seen in the table below:

Table 4. Sub Criteria of Facility

Name Of Assesment	Weight Criteria
Very Complete	1
Complete	0,8
Quite	0,5
Less	0,3
Incomplete	0,1

The sub–criteria for Facility of the wedding hall consists of 5 assessments. The Facility of the building is very complete, complete, complete enough, less complete and last assessments is incomplete. The following table contains the sub-criteria for determining the Parking Area of the wedding hall. These sub criteria can be seen in the table below:

Table 5. Sub Criteria of Parking Area

Name of Assessment	Weight Criteria
50 – 100 Vehicle	0,2
100 – 150 Vehicle	0,5
150 – 200 Vehicle	0,7

➢ 200 Vehicle	1

The sub–criteria for Parking Area of the wedding hall consists of 4 assessments. The Parking Area of the building can accommodate around 50 to 100 vehicles, 100 to 150 vehicles, 150 to 200 vehicles, and last assessments is more than 200 vehicles. The following table contains the sub-criteria for determining the Guest of the wedding hall. These sub criteria can be seen in the table below:

Table 6. Sub Criteria of Guest

Name of Assessment	Weight Criteria
50 – 100 Guest	0,2
100 – 150 Guest	0,5
150 – 200 Guest	0,8
➢ 200 Guest	1

The sub–criteria for Guest of the wedding hall consists of 4 assessments. The number of invited guests is around 50 to 100 guest, 100 to 150 guest, 150 to 200 guest, and last assessments is more than 200 guest. After determining the sub-criteria of the wedding hall in the several assessments, then determine some of alternative data or sample data. The following table contains the Alternative for determining the name of the wedding hall. These alternatives can be seen in the table below:

Table 6. Alternative of The Wedding Hall

Alternative Code	Name of The Wedding Hall
A01	Adi Mulia Hotel Medan
A02	Bel Mondo Caffe Medan
A03	Andaliman Hall
A04	Aceh Sepakat
A05	Al-Amjad Convention Hall
A06	Wisma Mahina Center
A07	Mutiara Suara Nafiri Convention Hall
A08	Balai Namaken
A09	Al-Maruf Building
A10	Dharma Wanita Petisah Building

After determining the alternative data of the wedding hall, then the criteria for each alternative are given, while the data is as follows:

Table 7. Criteria of Alternatives

	C1	C2	C3	C4	C5
A01	1	0,4	1	1	1
A02	1	0,4	1	1	1
A03	0,7	0,5	1	1	0,7
A04	0,7	0,5	0,8	0,7	0,7
A05	1	1	1	1	0,5
A06	0,7	1	1	1	0,5
A07	0,7		0,8	0,7	0,2
A08	1	0,5	1	1	0,5
A09	0,7	1	0,5	1	1
A10	0,7	1	0,8	0,7	1

The next step is to determine the minimal and the maximal values of criteria of the alternative that have been determined before. The values can be seen in the table below:

Table 8. Minimal and Maximal Values

	C1	C2	C3	C4	C5

A-	0,7	0,5	0,8	0,7	0,2
A+	1	1	1	1	1

The table below is used to display the matrix normalization utility values for each alternative according to its attributes. The values of matrix normalization utility are as follows:

Table 9. Normalization Utility Values

	C1	C2	C3	C4	C5
A01	(1-0,7)/(1-7)=0,05	(0,4-0,5)/(1-0,5)=-0,2	(1-0,8)/(1-0,8)=1	(1-0,7)/(1-0,7)=1	(1-0,2)/(1-0,2)=1
A02	(1-0,7)/(1-7)=0,05	(0,4-0,5)/(1-0,5)=-0,2	(1-0,8)/(1-0,8)=1	(1-0,7)/(1-0,7)=1	(1-0,2)/(1-0,2)=1
A03	(0,7-0,7)/(1-7)=0	(0,5-0,5)/(1-0,5)=0	(1-0,8)/(1-0,8)=1	(1-0,7)/(1-0,7)=1	(0,7-0,2)/(1-0,2)=0,625
A04	0,7)/(1-7)=0	(0,5-0,5)/(1-0,5)=0	(0,8-0,8)/(1-0,8)=0	(0,7-0,7)/(1-0,7)=0	(0,7-0,2)/(1-0,2)=0,625
A05	(1-0,7)/(1-7)=0,05	(1-0,5)/(1-0,5)=1	(1-0,8)/(1-0,8)=1	(1-0,7)/(1-0,7)=1	(0,5-0,2)/(1-0,2)=0,375
A06	(0,7)/(1-7)=0	(1-0,5)/(1-0,5)=1	(1-0,8)/(1-0,8)=1	(1-0,7)/(1-0,7)=1	(0,5-0,2)/(1-0,2)=0,375
A07	(0,7)/(1-7)=0	(0,5-0,5)/(1-0,5)=0	(0,8-0,8)/(1-0,8)=0	(0,7-0,7)/(1-0,7)=0	(0,2-0,2)/(1-0,2)=0
A08	(1-0,7)/(1-7)=0,05	(0,5-0,5)/(1-0,5)=0	(1-0,8)/(1-0,8)=1	(1-0,7)/(1-0,7)=1	(0,5-0,2)/(1-0,2)=0,375
A09	(0,7)/(1-7)=0	(1-0,5)/(1-0,5)=1	(0,5-0,8)/(1-0,8)=-1,5	(1-0,7)/(1-0,7)=1	(1-0,2)/(1-0,2)=1
A010	(0,7)/(1-7)=0	(1-0,5)/(1-0,5)=1	(0,8-0,8)/(1-0,8)=0	(0,7-0,7)/(1-0,7)=0	(1-0,2)/(1-0,2)=1

The table below is the result of normalization utility values:

Table 10. Result of Normalization Utility Values

Alternative	Criteria				
	C1	C2	C3	C4	C5
A01	0,05	-0,2	1	1	1
A02	0,05	-0,2	1	1	1
A03	0	0	1	1	0,625
A04	0	0	0	0	0,625
A05	0,05	1	1	1	0,375
A06	0	1	1	1	0,375
A07	0	0	0	0	0
A08	0,05	0	1	1	0,375
A09	0	1	-1,5	1	1
A010	0	1	0	0	1

The table below is used to display values of preferences. These steps determining rank of the result, while the calculation is as follows:

Table 11. Preferences Values

Alternative	Criteria					Total
	C1	C2	C3	C4	C5	
A01	0,05*0,15=0,75	-0,2*0,25=-0,05	1*0,15=0,15	1*0,25=0,25	1*0,20=0,2	11
A02	0,05*0,15=0,75	-0,2*0,25=-0,05	1*0,15=0,15	1*0,25=0,25	1*0,20=0,2	11
A03	0*0,15=0	0*0,25=0	1*0,15=0,15	1*0,25=0,25	0,625*0,20=0,125	10,125
A04	0*0,15=0	0*0,25=0	0*0,15=0	0*0,25=0	0,625*0,20=0,125	0,125
A05	0,05*0,15=0,75	1*0,25=0,25	1*0,15=0,15	1*0,25=0,25	0,375*0,20=0,075	20,825
A06	0*0,15=0	1*0,25=0,25	1*0,15=0,15	1*0,25=0,25	0,375*0,20=0,075	15,75
A07	0*0,15=0	0*0,25=0	0*0,15=0	0*0,25=0	0*0,20=0	0
A08	0,05*0,15=0	0*0,25=0	1*0,15=0,15	1*0,25=0,25	0,375*0,20=0,075	10,75
A09	0*0,15=0	1*0,25=0,25	-1,5*0,15=-0,225	1*0,25=0,25	1*0,20=0,2	5,675
A010	0*0,15=0	1*0,25=0,25	0*0,15=0	0*0,25=0	1*0,20=0,2	0,45

After successfully calculating preferences, the rankings obtained regarding The Wedding Hall that are suitable for use are as follows:

Table 12. Ranking Results

Kode	Alternative	Total	Ranking
A05	Al-Amjad Convention Hall	20,825	1
A06	Wisma Mahina Center	15,75	2
A01	Hotel Adi Mulia Medan	11	3
A02	Caffe Bel Mondo Medan	11	4
A03	Andaliman Hall	10,125	5
A08	Balai Namaken	10,75	6
A09	Gedung Serba Guna Al-Maruf	6,675	7
A010	Gedung Dharma Wanita Petisah	0,45	8
A04	Aceh Sepakat	0,125	9
A07	Mutiara Suara Nafiri Convention Hall	0	10

The Table above shows that Al-Amjad Convention Hall is the most suitable Building for The Weeding Ceremony base on the criteria.

4. CONCLUSION

Based on the results of the research and discussion that the author has carried out, it can be concluded that the Decision Support system that has been made can produce accurate calculations and will make accurate decisions in determining The Wedding Hall that are suitable to use in Medan. Implementation of the Multi Attribute Utility Theory (MAUT) was successfully applied in determining The Wedding Hall that are suitable to use for Wedding ceremony in Medan. By using the Multi Attribute Utility Theory (MAUT) method, the determination of Wedding Hall that are suitable for use in Medan can be carried out effectively based on predetermined criteria. In conclusion, Multi Attribute Utility Theory (MAUT) method can greatly assist users in making an accurate decision.

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