Model of Decision Support Method with SMART According to Choosing Venue

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Abstract. Many factors are considered when choosing venue for event, including budget, facility, location convenience, and capacity. This has become one of the factor for the success of an event. Choosing wrong event location results in inconvenience in organizing the event. Therefore, we need a model so that the event can be held comfortably. The model is created by selecting a location that matches the criteria of the event that matches the desired criteria. One of the appropriate methods to be used in decision making is the SMART (Simple Multi Attribute Rating Technique) method. To support research, a simulation module is created to select the location of the event. Based on the test scenario, it was found that the solution given by the system was accurate in choosing events and approaching human ability to make decisions.

1. Introduction
Venue is one of many factor considered event. To choose venue is not easy depend on factor to be considered. Due to many ordered to be handled by event organizer, so event organizer should be considered to find out location. To find location planning is a difficult task due to complexities in the evaluation process [1]. Event organizer may be relied on determine complete, accurate, and fit in with customer’s requirement. Main data collection for venue must be complete [2]. Many factor to find out decision, so that need decision process with many criteria to be solved. This process must be due to: criteria must be unique; criteria may conflict itself, for example customer want quality but they also want something not expensive; criteria can objectively measure (tangible criteria) such us flexibility, quality, and efficiency [3].

This paper contributes to our understanding of project management by event organizer which look for venue. Empirical setting is many event in many locations that have to suit the needs of consumers. The question explored in this paper is, therefore, how does the event fit in location with various considerations? Need to create decision method so that find solution to be dynamically organized well. Which one is decision method that fit in with cases? To answer this question and finding out solution, do by develop a model. Based on that, our contribution with this research is given alternative with the weight of the criterion.

The reminder of this paper is organized as follows. We first visit literature related to SMART method. Following this, there search methodology and the data analysis using structural equation modeling are presented. The paper concludes with a discussion of results, contributions to theory and practice, limitations, and suggestions for future research.
2. Related Work
Focus of research divided into two subsections. Section 2.1 is an overview to select venue, and section 2.2 is an overview about SMART methodology.

2.1. Select Venue
Location associated with cost and area, so that, to find right location must be collected location network with their facilities. There was old methodology called Facility Location Problem (FLP) [4] which is involves taking the minimum cost as a single objective using mathematical model to solve a problem.

| References | correlation | Main findings |
|------------|-------------|---------------|
| [5]        | Service user involvement | User participation became one factor to success an event |
| [6]        | Closeness centrality related to location, betweenness related to location, degree related to capacity, budget, and facility | Venue representation has 3 influence: closeness, betweenness, degree |

2.2. SMART Methodology
SMART methodology is one of the criteria held by Multiple Criteria Decision Making (MCDM). SMART uses linear approximations to single-dimension function [7]. It aims to give solution by adding weight on criteria then compared between multiple attributes and multiple criteria [8] [9].

3. Method
3.1. Collect Data
Data which collected is venue criteria, based on questionnaire to event organizer. There are 4 (four) factor that influence venue. There is budget, location, facility, and capacity. Budget criteria’s level is from low to high, and other criteria is from high to low. It is related to cost and benefit.

3.2. Measurement
Measurement is done by qualitative way. There is data for measurement:
- Budget. Price for renting venue. Divided to 3 categories:
  - Cheap price: Less than Rp. 10,000,000,-
  - Medium Price: Between Rp. 10,000,000,- – Rp. 20,000,000,-
  - Expensive price: More than Rp. 20,000,000,-
- Location
  - City centre: Location in city centre
  - Suburbs: Location in suburbs
  - Rural: Location in rural
- Facility
  - Very adequate: Full facilities
  - Adequate: Half facilities
  - Inadequate: Les Facilities
- Capacity
3.3. Analysis Tools
Step by step SMART Methodology [9]:
   a. Determine criteria weight. Data can be obtained by interview, questionnaire, or observation.
   b. Normalized criteria weight. There is formula to normalize as shown on Figure 1.
   c. Determine parameter value. Parameter value can be qualitative or quantitative depend on data.
   d. Determine utility value. Divided 2 (two): cost criteria and benefit criteria.
   e. Determine ranking. Sort ranking based on calculation.

3.4. Model of Venue Criteria using SMART Methodology
Data from subsection 3.1 – 3.3 is become a model to get venue criteria which is using SMART Methodology as follow in Figure 1.

![Figure 1. Model of venue criteria using SMART methodology](image)

From Figure 1, Based on venue criteria, then input into SMART formula, then venue that fit in user requirement is obtained.

4. Result and Discussion
The methodology proposed in section 3 was used to identify SMART as solution. The steps of calculation to solve a problem are shown in section 4.1 – 4.10

4.1. Find criteria of assessment for Venue
Determine the number of criteria for selecting event location based on section 3, as follow in Table 2. Criteria.

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Good capacities: more than 1,000 seat
Enough capacities: 500 to 1,000 seat
Less capacities: less than 500 seat
### Table 2. Criteria

| Code | Criteria | Rating                | Information                      |
|------|----------|-----------------------|----------------------------------|
| C1   | Budget   | Cheap price           | <= Rp.10,000,000                 |
|      |          | Medium price          | 10,000.001 – 20,000.000          |
|      |          | Expensive price       | >20,000,000                      |
| C2   | Location | City center           | Location in city center          |
|      |          | Suburbs               | Location in suburbs              |
|      |          | Rural                 | Location in rural                |
| C3   | Facility | Very adequate         | Full facility                    |
|      |          | Adequate              | Half facility                    |
|      |          | Inadequate            | Less facility                    |
| C4   | Capacity | Good capacity         | >1000 seat                       |
|      |          | Enough capacity       | 500 – 1000 seat                  |
|      |          | Less capacity         | <500 seat                        |

4.2. Find weights of assessment

Weight given from 1 to 100 scale and it’s become default value to system. Weight is obtained from questionnaire as follow:

### Table 3. Selection of Weight

| Criteria | Weight ($w_j$) |
|----------|----------------|
| C1       | 90             |
| C2       | 75             |
| C3       | 80             |
| C4       | 85             |
| Total    | 330            |

Weight of criteria determined by user based on importance level of criteria. Biggest weight is C1 and smallest one is C2.

4.3. Normalization

Based on weight in Table 3, then normalize by dividing the value of criteria weight ($w_j$) by the number of values ($\sum w_j$) as Table 4. follows.

### Table 4. Determination of Relative Weight

| Criteria | Weight ($w_j$) | Relative weight |
|----------|----------------|-----------------|
| C1       | 90             | 0.273           |
| C2       | 75             | 0.227           |
| C3       | 80             | 0.242           |
| C4       | 85             | 0.257           |

4.4. Criteria value

Provide parameter values and criterion values for all alternatives.

### Table 5. Criteria Value

| Criteria | Parameter     | Criteria value ($C_{out}$) |
|----------|---------------|---------------------------|
| Budget   | Cheap price   | 3                         |
|          | Medium price  | 2                         |
|          | Expensive price| 1                         |
Location          | City center | 3 |
|------------------|-------------|---|
| Suburbs          | 2           |
| Rural            | 1           |

Facility          | Very adequate | 3 |
|------------------|---------------|
| Adequate         | 2             |
| Inadequate       | 1             |

Capacity          | Good capacity | 3 |
|------------------|---------------|
| Enough capacity  | 2             |
| Less capacity    | 1             |

4.5. Alternative data

Alternative data adjusted to criteria of event location that result criterion value.

| Table 6. Alternative and Weight Value |
|--------------------------------------|
| Alternative Event location           | C1 | C2 | C3 | C4 |
|--------------------------------------|----|----|----|----|
| 1 Prawatasari Cianjur Park           | 2  | 3  | 1  | 3  |
| 2 BCNY Cianjur                        | 3  | 1  | 1  | 3  |
| 3 Herlina Mutiara Building           | 2  | 2  | 2  | 2  |
| 4 Assakinah Building                  | 2  | 3  | 2  | 2  |
| 5 Bydiel Hotel                        | 1  | 2  | 3  | 1  |

4.6. Utility Value

Criterion value then convert to utility value. Utility value has two criteria, there are benefit criteria and cost criteria. Utility value benefit criteria “more desirable greater value”.

| Table 7. Utility Value Benefit Criteria |
|-----------------------------------------|
| Criteria Value (C_{out})                | \frac{C_{out} - C_{min}}{C_{max} - C_{min}} | Utility Value |
|-----------------------------------------|---------------------------------------------|---------------|
| 3                                       | \frac{3 - 1}{3} = 1                        | 1             |
| 2                                       | \frac{3 - 1}{2 - 1} = 1                     | 0.5           |
| 1                                       | \frac{3 - 1}{1 - 1} = 2                     | 0             |

Based on Table 7. and Table 8. \( c_{max} \) = parameter value greatest criterion; \( c_{out} \) is criterion parameter value; \( c_{min} \) is smallest criterion parameter value.

Utility value cost criteria “more desirable smallest value”.

| Table 8. Utility Value Cost Criteria |
|---------------------------------------|
| Criteria Value (C_{out})              | \frac{C_{max} - C_{out}}{C_{max} - C_{min}} | Utility Value |
|---------------------------------------|---------------------------------------------|---------------|
| 3                                     | \frac{3 - 3}{3 - 1} = 0                     | 0             |
| 2                                     | \frac{3 - 1}{3 - 2} = 1                     | 0.5           |
| 1                                     | \frac{3 - 1}{3 - 1} = 1                     | 1             |

|                | 1 | 2 | 3 | 4 | 5 |
|----------------|---|---|---|---|---|
| City center    | 3 |   |   |   |   |
| Suburbs        | 2 |   |   |   |   |
| Rural          | 1 |   |   |   |   |
| Very adequate  | 3 |   |   |   |   |
| Adequate       | 2 |   |   |   |   |
| Inadequate     | 1 |   |   |   |   |
| Good capacity  | 3 |   |   |   |   |
| Enough capacity| 2 |   |   |   |   |
| Less capacity  | 1 |   |   |   |   |
4.7. Conversion result
Based on utility value, Table 7. And Table 8 converted to Table 9.

| Table 9. Evaluation Factor |
|---------------------------|
| Event Location            | C1 | C2 | C3 | C4 |
| Prawatasari Cianjur Park  | 0.5| 1  | 0  | 1  |
| BCNY Cianjur              | 0  | 0  | 0  | 1  |
| Herlina Building          | 0.5| 0.5| 0.5| 0.5|
| Assakinah Building        | 0.5| 1  | 0.5| 0.5|
| Bydiel Hotel              | 1  | 0.5| 1  | 0  |

4.8. Calculation result
Result form each alternatives then normalized with formula as follow:

$$\sum_{j=1}^{m} w_j . u_i(a_i)$$

And produce Table 10. as follows:

| Table 10. Evaluation Result |
|-----------------------------|
| Event Location              | Result |
| Prawatasari Cianjur Park    | 0.621  |
| BCNY Cianjur                | 0.257  |
| Herlina Building            | 0.500  |
| Assakinah Building          | 0.614  |
| Bydiel Hotel                | 0.629  |

4.9. Criteria based on User
After knowing the result then input criteria based on user needs. As shown on Table 11.

| Table 11. User Input Criteria |
|-------------------------------|
| Criteria | Sub-criteria | Value | Value normalization | Result |
|----------|--------------|-------|---------------------|--------|
| Budget   | Medium price | 2     | 0.5                 | 0.48   |
| Location | City Center  | 3     | 1                   |        |
| Facility | Adequate     | 2     | 0.5                 |        |
| Capacity | Less Capacity| 1     | 0                   |        |

4.10. Ranking list
Results obtain from difference between the normalized value and calculated value, then ranks according to smallest difference value.

| Table 12. Ranking List |
|------------------------|
| Event Location         | Value     | Rating |
| Prawatasari Cianjur Park | 0.621-0.48=0.141 | 4     |
| BCNY Cianjur            | 0.257-0.48=0.222 | 5     |
| Herlina Building        | 0.5-0.48=0.022  | 1     |
| Assakinah Building      | 0.61-0.48=0.130 | 2     |
| Bydiel Hotel            | 0.62-0.48=0.140 | 3     |

Based on Table 12, location for event according to user input is **Herlina building**.
5. Conclusion

This paper presents a detailed approach on how to apply the SMART methodology to give solutions for finding event location. Contribution from this paper, step by step, the SMART method is applied in location search for events, and location to procure an event that fits user needs is obtained. In future research, every venue has different characteristics, so it can’t apply the same in the general practice. So that, criteria can be more complex.

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