

## ANALYSIS OF PUBLIC PERCEPTIONS OF FUTURE SPATIAL PLANNING DECISION MODEL LHOKSEUMAWE CITY

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### ABSTRACT

*Lhokseumawe urban spatial planning for future development should be considered, to determine the extent to which development feasibility in the application of decision models in the analysis of public perception of the future planning of urban spatial lhokseumawe. So that when the development has been reached the community can use the facilities that have been built built and in accordance with the wishes of the community. Therefore, it is necessary to analyze a decision model in the analysis of community perception of the best future planning as a place of future planning.*

*The specific objective of this research is to analyze the impact of the policy according to the society's perception on the future planning of urban spatial planning of lhokseumawe by using the model in decision making for future planning of Lhokseumawe urban spatial planning. Decision-makers can see the highest rankings of future community perceptions for the changing spatial policy of the city of Lhokseumawe seen from various variables that can be seen from the economic, political and social facilities and infrastructure, and the form / concept of planning future urban spatial planning in the perception of society's wishes.*

*Model in this research use Descriptive Analysis method in making variable analysis according to society perception and model SAW (Simple Addictive Weigthing) in ranking. The use of SAW model as one of decision model in decision making to society. The data collected from this research through descriptive analysis from perception of society toward policy analysis of spatial change of lhokseumawe cover economic aspect consist of job opening, income earned, and income level; environmental aspects include aesthetic concept, safety, hygiene function that will be included into the process of ranking is the sum of matrix matrix normalized R with weight vector to obtain the largest value selected as the best alternative as a solution for the perception of society to the analysis of policy change of urban spatial.*

**Keywords:** Spatial Change Policy, Descriptive Analysis, Saw, Decision Making System

### INTRODUCTION

Urban planning Lhokseumawe has an important role in shaping urban spatial planning. Urban planning initially emerged as a response to modern cities experiencing growth especially in economic activity. Developments in the trade sector for example led to the development of new cities as the center of government and economic growth. Development contains an understanding of improvement. While the definition of the Area, the region with the main function of residential or housing space which is a geographical unity and all elements related to it whose limits and systems are determined based on functional aspects and have specific / specific / specific envy. (Spatial Law, 2010).

As with the development of cities in Indonesia in general, the development of the city of lhokseumawe in particular experienced the same physical problems of the city. This is

evident from the not well-defined problem of good urban infrastructure. It is therefore necessary to plan the future of the city of Lhokseumawe to overcome these problems and in accordance with the wishes of community perception. There is a belief that social problems can be solved by redesigning the city (Rydin, 1993: 17; Krueckeberg, 1997: 3; Yewlett, 2001: 1304; Thorns, 2002: 180; UN-Habitat, 2011: 49).

This brings with it sustainable planning to find a better paradigm to deal with the complexities of urban environments. From here then began to develop the theory of planning as a guide framework in planning. Programs in planning institutions typically present two models of planning theory: theories about the planning process and theories about the context or content (substance) of planning, eg theories about the structure of urban space (Fainstein, 2005: 121).

It can be said that planning theory consists of two elements, namely elements of things to be achieved and elements of the way to achieve them (Rustiadi, 2009: 336) or procedural and substantive components (Klaasen, 2003: 73). However, in recent decades there has been a new paradigm of planning in guiding planners in the practical or professional world (Innes, 1983: 35; Pallagst, 2006: 7).

Concerning city spatial planning, Mirsa (2011: 15) says that: "In planning, designing and programming of urban infrastructure, the main thing to note about the elements of urban spatial planning itself is the preparation of planning, utilization and control". with that in mind, the utilization of the elements or elements of urban spatial in this case is the City of Administration will be more focused especially in realizing the development of environmentally sound city.

In urban planning itself known as open space (open space) that is open place in urban environment, open space consist of green open space and non-green open space (Pancawati, 2010: 6).

Green open spaces in urban areas are part of urban spatial arrangement that serves as a green area of city parks, green areas of urban forest, green recreation areas of the city, green areas of urban sports activities, green cemetery, green agricultural areas, green areas of greenways, and green area of the yard (Fattah, 2001: 11).

## **LITERATURE REVIEW**

### **Spatial**

Space is an important element in human life that availability is limited. The space itself can be distinguished into land space, sea, air space and inner space (Law No. 26 of 2010). Space is said to be an important element because space is a container of all activities and interests undertaken by humans. On the other hand activities carried out by humans are very diverse, which is likely to occur conflicts of interest and may cause environmental damage. Therefore, to avoid it required a spatial arrangement in order to accommodate all activities and interests without causing negative impact.

Spatial Quality Based on Spatial Policy In relation to spatial planning activities, it is necessary to understand the essence and understanding of everything related to spatial planning activities, which can be understood through Law Number 26 Year 2007.

### **SAW (Simple Additive Weighting)**

The SAW (Simple Additive Weighting) method is often called the weighted sum method. The basic concept of the SAW method is to find the weighted sum of the performance of each alternative on all attributes (Kusumadewi et al, 2010).

The SAW method requires the process of normalizing the decision matrix (X) to a scale comparable to all existing alternative ratings. Furthermore, after the value obtained from the weight of each criterion, will be included into the value of normaliasi  $r_{ij}$  that is as follows:

$$r_{ij} = \begin{cases} \frac{x_{ij}}{\max x_{ij}} & \text{If } j \text{ attribute benefit (benefit)} \\ \frac{1}{\max x_{ij}} & \\ \frac{1}{x_{ij}} & \text{If } j \text{ attribute cost (cost)} \end{cases} \dots\dots\dots (1)$$

Information:

- $r_{ij}$  = normalized performance rating value
- $x_{ij}$  = attribute value owned by each criterion
- Max  $x_{ij}$  = the largest value of each criterion  $i$
- Min  $x_{ij}$  = the smallest value of each criterion  $i$
- Benefit = if the greatest value is best
- cost = if the smallest value is best

Where  $r_{ij}$  is the normalized performance rating of the alternative  $A_i$  on the attribute  $C_j$ ;  $i = 1, 2, \dots, m$  and  $j = 1, 2, \dots, n$ . The preference value for each alternative ( $V_i$ ) is given as:

$$V_i = \sum_{j=1}^n w_j r_{ij} \dots\dots\dots (2)$$

Information :

- $V_i$  = rank for each alternative
- $w_j$  = weighted value of each criterion AND  $r_{ij}$  = normalized performance rating value

**RESEARCH METHODS**

**Stages of Research**

Stages of research Application of Decision Model in the Analysis of Public Perceptions of Future Planning Spatial Lhokseumawe is as follows:

- i. Problem identification: (a) mapping the future spatial planning space utilization in Lhokseumawe city, in this context the problem is about the analysis of the places that will be the future development, for example the terminal, the fruit market of lhokseumawe city and the inn for merchants . Analysis The arrangement of decision models in the analysis of community perceptions of future planning includes feasibility analysis of the building site, Spatial Planning Feasibility Analysis, environmental analysis, non-physical analysis covering social, economic and social culture.
- ii. Decriptive analysis to analyze spatial planning of lhokseumawe in the future, which will serve as a new decision making planning information which then analyze the spatial period of tepan which is about spatial blood area for settlement in Lhokseumawe City by paying attention to physical and non physical aspect and making SAW model.
- iii. Requirement Analysis: (a) analyzing the future spatial planning data requirements obtained at the Regional Development Planning Board (BAPPEDA) for inclusion into the SAW variable; (b) Analyzing initial data requirements of the Public Works

- Department for Settlement Resilience Analysis; (c) Separation of all data to be incorporated into the SAW model after being analyzed using the analytical deksktif;
- iv. SAW Model At this stage of the study describes the criterion variable and determine the alternative location planning future development. SAW model; (e) create tables of criteria and alternatives that have been adapted for testing of the system; (f) create a system input view, process and system results in the form of regional view that will make the place of future planning.
  - v. Implementation of the Model: (a) Testing the application of the SAW model into the normalization matrix (R), determining the weighting and the value of positive and negative solutions, and calculating the preference value for each alternative; (b) Displays the calculation results of the SAW model for the relocation site view and the area to be designated for future planning sites.

### VARIABLES OBSERVED / MEASURED

1. The first step of the analysis of public perceptions on the future planning of urban spatial planning lhokseumawe include criteria:
  - a. The economic aspect (X1) consists of job opening (C1), earned income (C2), and income earned (C3);
  - b. Environmental aspects (X2) include aesthetic concept (C1), security (C2), cleanliness function (C3).
  - c. Aspects of Facilities and Facilities (X3): Transportation Facilities (C1), Road Facilities (C2), Electricity Facilities (C3), Water Services (C4).
2. Decriptive analysis is to make the analysis before inserted into the system include economic aspects (X1), environmental aspects (X2), Aspects of Facilities and Facilities (X3) and provides a range of criteria to be used as assessment criteria.
3. Third Step The process of calculation of SAW method that has been analyzed in planning future spatial lhokseumawe is as follows:
  - a. Provide the value of each alternative ( $A_i$ ) on each criterion ( $C_j$ ) that has been determined, where the value is obtained based on crisp value;  $i = 1, 2, \dots, m$  and  $j = 1, 2, \dots, n$ .
  - b. Gives a weighted value (W) which is also obtained based on the perception value of the decision maker.
  - c. Perform normalized matrices by calculating the normalized performance rating ( $r_{ij}$ ) value of the  $A_i$  alternatives in the  $C_j$  attribute based on the equation that is matched to the attribute type (attribute benefit = Maximum or cost attribute / cost = Minimum).
  - d. If it is a profit meaning, the crisp ( $X_{ij}$ ) value of each attribute column is divided by the crisp MAX (MAX  $X_{ij}$ ) value of each column, while for the cost attribute, the MIN crisp (MIN  $X_{ij}$ ) value of each attribute column is divided by the crisp value ( $X_{ij}$ ) each column.
  - e. Perform the ranking process by multiplying the normalized matrix (R) with the weight value (W).
  - f. Determine the preference value for each alternative ( $V_i$ ) by summing the product of the normalized (R) matrix with the weight value (W). A larger value of  $V_i$  indicates that  $A_i$ 's alternatives are preferred.
4. The Fourth step is to see the results of the ranking process for each region that will be used as the planning place for the future of lhokseumawe

## **RESEARCH DESIGN**

Model steps for applying decisions in the analysis of community perceptions of future planning of urban spatial planning lhokseumawe:

- i. Analyzing the development of urban spatial planning lhokseumawe in accordance with RUTRK Lhokseumawe Kepmen 33/1992 permendagri 2/1987 Perda no. 7/1999
- ii. Analyze internal needs including Topography, Hydrology, Geography and External cover Population, Economy, Transportation, Urban Service Facilities and Policy.
- iii. Analyzing the Problem of Land Use Change (seen from the utilization, function and objective according to RUTRK of Lhokseumawe).
- iv. Analyzing Research Questions How to Perception of society Against the planning of the next lhokseumawe city
- v. Identifying the Public Perception on RUTRK Lhokseumawe, Identification of Land Use, Identification of Spatial Structure of City, Identification of City Development
- vi. Analyzing Public Perception Against RUTRK of Lhokseumawe City for planning of development city in the future to be used as criteria
- vii. Data analysis criteria include
  - a. Economic aspects (X1),
  - b. Environmental aspects (X2),
  - c. Aspects of Facilities and Facilities (X3)
- viii. Creating process calculation model that has been analyzed criteria using SAW method, as for the steps of topsis method include: determining criteria / variables that will be used as a reference in decision making, making a normalized decision matrix, making a normalized decision matrix weighted, ranking preferences.

Greater values indicate that the alternative future planning chosen based on the public perception will be prioritized.

## **RESULTS AND DISCUSSION**

### **System analysis**

Developments in the trade sector for example led to the development of new cities as the center of government and economic growth. Development contains a sense of development and improvement. Lhokseumawe urban spatial planning for future development should be considered, to determine the extent to which development feasibility in the application of decision models in the analysis of public perception of the future planning of urban spatial lhokseumawe. So that when the development has been reached the community can use the facilities that have been built and in accordance with the wishes of the community.

Urban planning Lhokseumawe has an important role in shaping urban spatial planning. Urban planning initially emerged as a response to modern cities experiencing growth especially in economic activity. Analyze the impact of the policy according to society's perception of future planning of lhokseumawe urban spatial using model in decision making for future planning of Lhokseumawe urban spatial planning.

Decision-makers can see the highest rankings of future community perceptions for the changing spatial policy of the city of Lhoksemawe seen from various variables that can be seen from the economic, political and social facilities and infrastructure, and the form / concept of planning future urban spatial planning in the perception of society's wishes.

Model in this research use Descriptive Analysis method in making variable analysis according to society perception and model SAW (Simple Addictive Weigthing) in ranking. The use of SAW model as one of decision model in decision making to society.

The data collected from this research through descriptive analysis from perception of society toward policy analysis of spatial change of lhokseumawe cover economic aspect consist of job opening, income earned, and income level; environmental aspects include the concept of aesthetics, security, the best alternative as a solution for the community's perception of the policy analysis of changes in urban spatial planning.

The result of this model is recommendation from each perception of society to analysis of policy of change of urban spatial. The results of this study indicate that the analyzed system has the ability to support decision makers in determining the future planning of urban spatial planning lhokseumawe.

This SAW model seeks to analyze each future development plan that will be built based on the analysis of the criteria of the feasibility assessment of the settlement analysis and the analysis of data derived from the head of the public works office. The result of this system is the highest ranking of future development planning based on people's perception. Furthermore, SAW method can provide recommendations for the community and Dinas.

### Model Testing Analysis

The process model in the development of simple additive weighting system in manual testing includes at the following stages:

#### Criteria Analysis

The analysis of public perceptions on the future planning model of spatial planning Lhokseumawe City for each region are as follows:

**Table 1. Criteria Table**

<b>A. Infrastructure and facilities</b>			
<b>A.1</b>	Clean Water and Electricity	Adequate	5
		Medium	3
		Less	1
<b>A.2</b>	Drains	Adequate	5
		Medium	3
		Less	1
<b>A.3</b>	Road Facilities	Adequate	5
		Medium	3
		Less	1
<b>A.4</b>	Education: kindergarten, elementary, junior high and high school	Kindergarten, elementary, junior high and high school	5
		Elementary, junior and senior high school	3
		Kindergarten and elementary school	1
<b>A.5</b>	Health, such as: Medical Center, Maternity Hospital (BKIA), Puskesmas, doctor and pharmacy practice.	Maternity Hospital (BKIA), Puskesmas, doctor and pharmacy practice.	5
		Puskesmas, doctors and pharmacies.	3
		Puskesmas and pharmacies.	1

<b>B. Building Density and Population</b>			
<b>B.1</b>	Building density	Medium	5
		Solid	3
		Very solid	1
<b>B.2</b>	Population density	Medium	5
		Solid	3
		Very solid	1
<b>C. Speed of Regional Development</b>			
<b>C.1</b>	Speed of Regional Development	Fast	5
		Medium	3
		Low	1
<b>D. Economic and Environmental Aspects</b>			
<b>D.1</b>	Field of work	Easy	5
		Medium	3
		difficult	1
<b>D.2</b>	Income level	0-1million	1
		1-2million	3
		3-5million	5
<b>D.3</b>	Aesthetic Concepts	Good	5
		Medium	3
		less	1
<b>D.4</b>	Security	Secure	5
		less secure	3
		not safe	1

### Criteria Value Data

The value data value criteria Analysis of public perception of the future planning model of spatial planning Lhokseumawe City is as follows:

**Table 2. Criteria Values**

Alternative	Criteria			
	(C1)	(C2)	(C3)	(C4)
Area A	5	3	4	3
Area B	5	5	3	5
Area C	3	3	3	3
Area D	1	3	4	4
Area E	5	4	5	4

### Description of Table

- a. Infrastructure and facilities (C1)
- b. Building and Population Density (C2)
- c. Speed of Area Development (C3)
- d. Economic and Environmental Aspects (C4)

### Weight Value Data

The Data The weight value of each SAW value criterion is as follows:

**Table 3. Weights Each Criterion**

Criteria	Information	Weight (w)
C1	Infrastructure and facilities	35
C2	Building Density and Population	25
C3	Speed of Regional Development	15
C4	Economic and Environmental Aspects	25

**Making a Normalized Matrix**

The following is the result of a normalized matrix for the analysis of public perception of the future planning model of spatial planning Lhokseumawe City is as follows:

**Table 4. Weight Normalization**

Alternative	Criteria			
	(C1)	(C2)	(C3)	(C4)
Area A	1	0.6	0.8	0.6
Area B	1	1	0.6	1
Area C	0.6	0.6	0.6	0.6
Area D	0.2	0.6	0.8	0.8
Area E	1	0.8	1	0.8

The normalized matrix calculation of its completion steps is as follows:

**Table 5. Weight Normalization**

Name	(C1)	(C2)	(C3)	(C4)
Area A	$\frac{5}{5} = 1$	$\frac{3}{5} = 0.6$	$\frac{4}{5} = 0.8$	$\frac{3}{5} = 0.6$
Area B	$\frac{5}{5} = 1$	$\frac{5}{5} = 1$	$\frac{3}{5} = 0.6$	$\frac{5}{5} = 1$
Area C	$\frac{3}{5} = 0.6$	$\frac{3}{5} = 0.6$	$\frac{3}{5} = 0.6$	$\frac{3}{5} = 0.6$
Area D	$\frac{1}{5} = 0.2$	$\frac{3}{5} = 0.6$	$\frac{4}{5} = 0.8$	$\frac{4}{5} = 0.8$
Area E	$\frac{5}{5} = 1$	$\frac{4}{5} = 0.8$	$\frac{5}{5} = 1$	$\frac{4}{5} = 0.8$

Assessment of Alternative Value Vi

**Table 6. Preferences Table**

Alternative	Criteria				Total
	(C1)	(C2)	(C3)	(C4)	
Area A	0.35	0.15	0.12	0.15	0.77
Area B	0.35	0.25	0.09	0.25	0.94
Area C	0.21	0.15	0.09	0.15	0.6
Area D	0.07	0.15	0.12	0.2	0.54
Area E	0.35	0.2	0.15	0.2	0.9



The calculation of the preference values of its completion steps are as follows:

$$\text{Area A} = (1 \times 0.35) + (0.6 \times 0.25) + (0.8 \times 0.15) + (0.6 \times 0.25) = 0.77$$

$$\text{Area B} = (1 \times 0.35) + (1 \times 0.25) + (0.6 \times 0.15) + (1 \times 0.25) = 0.94$$

$$\text{Area C} = (0.6 \times 0.35) + (0.6 \times 0.25) + (0.6 \times 0.15) + (0.6 \times 0.25) = 0.54$$

$$\text{Area D} = (0.2 \times 0.35) + (0.6 \times 0.25) + (0.8 \times 0.15) + (0.8 \times 0.25) = 0.54$$

$$\text{Area E} = (1 \times 0.35) + (0.8 \times 0.25) + (1 \times 0.15) + (0.8 \times 0.25) = 0.9$$

Display login system in determining Model Decision Planning Future Spatial City Lhokseumawe are as follows:



Figure 1. Login System

### Home View

The main menu view of community perception analysis on decision models in Future Planning of Lhokseumawe City Spatial Planning is as follows:



Figure 2. Display Home Page

### Criteria Data View

The display of criteria menu data on the analysis of public perceptions of the decision model in the Future Planning of Lhokseumawe City Spatial is as follows:

Data Kriteria				
Daftar Kriteria - tambah				
Tindakan	No	Kriteria	Kaidah	Bobot
Edit Delete	1	Cost	Air Bersih Dan Listrik	3
Edit Delete	2	Cost	Saluran Air /Drainase	3
Edit Delete	3	Cost	Fasilitas Jalan	4
Edit Delete	4	Cost	Pendidikan : TK, SD, SMP Dan SMA	2
Edit Delete	5	Cost	Kesehatan, Seperti : Balai Pengobatan, RS Bersalin	3
Edit Delete	6	Cost	Kepadatan Bangunan	2
Edit Delete	7	Cost	Kepadatan Penduduk	3
Edit Delete	8	Cost	Kecepatan Perkembangan Kawasan	5
Edit Delete	9	Cost	Bidang Pekerjaan	2
Edit Delete	10	Cost	Tingkat	3

Figure 3. Display of Criteria Data

### Alternative Data

The display of alternative menu data on the analysis of community perceptions of the decision model in the Future Planning of Lhokseumawe City Spatial is as follows:

Data Alternatif		
Daftar Alternatif - tambah		
Tindakan	No	Alternatif
Edit Delete	1	A1
Edit Delete	2	A2
Edit Delete	3	A3

Figure 4. Display of Alternate Data

### SAW Process Data View

Display data of participants' value of each alternative in the analysis of community perceptions of the decision model in the Future Planning of Lhokseumawe City Spatial is as follows:

Nilai Peserta Tiap Kriteria														
No	Peserta	Kriteria												
		Air B	Salur	Fasil	Pendi	Keseh	Kepad	Kepad	Kecap	Bidan	Tingk	Konse	Keama	
1	A1	3	5	3	5	3	3	3	5	3	5	3	3	
2	A2	3	5	3	1	5	3	3	5	3	3	3	5	
3	A3	3	5	5	3	3	1	3	5	1	3	3	3	
Kaidah		min	min	min	min	min	min	min	min	min	min	min	min	
Bobot Kriteria		3	3	4	2	3	2	3	5	2	3	2	3	
Normalisasi (R)														
No	Peserta	Kriteria												
		Air B	Salur	Fasil	Pendi	Keseh	Kepad	Kepad	Kecap	Bidan	Tingk	Konse	Keama	
1	A1	1.00	1.00	1.00	0.20	1.00	0.33	1.00	1.00	0.33	0.60	1.00	1.00	
2	A2	1.00	1.00	1.00	1.00	0.60	0.33	1.00	1.00	0.33	1.00	1.00	0.60	
3	A3	1.00	1.00	0.60	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Nilai Preferensi (V)														
No	Peserta	Kriteria												Hasil
		Air B	Salur	Fasil	Pendi	Keseh	Kepad	Kepad	Kecap	Bidan	Tingk	Konse	Keama	
1	A1	3.00	3.00	4.00	0.40	3.00	0.66	3.00	5.00	0.66	1.80	2.00	3.00	29.52
2	A2	3.00	3.00	4.00	2.00	1.80	0.66	3.00	5.00	0.66	3.00	2.00	1.80	29.92
3	A3	3.00	3.00	2.40	0.66	3.00	2.00	3.00	5.00	2.00	3.00	2.00	3.00	32.06
Perangkingan														
Peserta													Hasil	Rangking
A3													32.06	1
A2													29.92	2
A1													29.52	3

Figure 5. Display of Alternate Data

### SAW Report Data View

The data view of the report menu to see rankings on the analysis of public perceptions of the decision models in the Lhokseumawe Urban Spatial Planning is as follows:

Peserta	Kriteria													Bobot	Rangking
	Air B	Salur	Fasil	Pendi	Keseh	Kepad	Kepad	Kecap	Bidan	Tingk	Konse	Keama			
A3	3	5	5	3	3	1	3	5	1	3	3	3	32.06	1	
A2	3	5	3	1	5	3	3	5	3	3	3	5	29.92	2	
A1	3	5	3	5	3	3	3	5	3	5	3	3	29.52	3	

Figure 6. Display of Alternate Data

### CONCLUSIONS

1. The result of this model is recommendation from each perception of society to analysis of policy of change of urban spatial. The results of this study show that the analyzed system has the ability to support decision makers in determining future planning of urban spatial planning lhokseumawe
2. The result of this analysis is the future planning of lhokseumawe urban spatial as the best development place based on the selected variable.
3. With the existence of this system analisisi facilitate the community in seeing the direction of planning the city in the future.

### RECOMMENDATIONS

1. The existence of other methods for the results in order for this system can be displayed optimally and there is a method of weighting for more subjective results.
2. The database used should always change in a certain period to keep up to date and better use oracle database for data collection can be larger.

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