

# **RESEARCH ARTICLE**

## ANALYSIS OF THE USE OF GREEN OPEN SPACE IN LUBUK PAKAM CITY'S TRIANGLE FIELD

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### Manuscript Info

### Abstract

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..... Green open spaces are really needed by residents in an area, the goal is for the public interest which is facilitated by various facilities that should be in a green open space plan. The LubukPakam City Triangle Field provides public facilities that have functions in ecological, sociocultural, recreational and economic aspects. Every green open space formed aims to be used by the community for certain purposes. Therefore, green open spaces must be properly planned and appropriate in accordance with the Law governing Green Open Spaces. so that the planned and built Green Open Spaces are not just public facilities that are used by the community but can be recognized as Green Open Spaces because their eligibility is adjusted to the law regarding official Green Open Spaces. The nearby study analyses the solid waste management in Tamil Nadu. Solid waste comprised all the wastes arising from human and animal activities that are normally solid and that are discarded useless or unwanted. The increasing difficulty in managing wastes in different states in Tamil Nadu. On the basis of the results, it was recommended to increase public awareness through enlightenment campaign against danger of indiscriminate dumping of wastes as they affect human health.

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## **Introduction:-**

LubukPakam City is a city that is not too big, but produces a significant population growth rate every year(Endangsih et al., 2022). Population growth which continues to increase every year will also affect the Green Open Space in the city of LubukPakam, namely the Triangle Square. This increasing population will also affect the facilities and infrastructure in the triangular field which is a green open space that is public in nature, so it can be visited and used by anyone at any time(Wang et al., 2019).

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According to EkoBudiharjo (1999:29), public space is a place where residents make social contact, in a traditional community environment there are always people of various races. Starting from communal yards, village squares, neighborhood squares, to city-scale squares(Sihombing & Hutapea, 2022). Public spaces for residents who have died, namely in the form of public cemeteries, have been prepared even for several generations.

Green Open Space will also provide urban aesthetics and will increase the quality of the urban environment. Based on Law No. 26 of 2007 concerning spatial planning, every city must provide Green Open Space in every

**Corresponding Author:- Janter Napitupulu** Address:- Departementof Electrical Engineering, Darma Agung University. city(Fahreza et al., 2022; Murtini et al., 2020). In addition to aesthetics, Green Open Space is needed with indicators of population, oxygen demand, and clean water needs(Nurliah & Tajuddin, 2021).

The Triangle Field is studied to analyze whether it meets the Green Open Space standards, from the provision of facilities in it and fulfills in any category of aspects(Fahreza et al., 2022). For example, the availability of public cemeteries, the public cemeteries provided in this triangular field meet the standards of Green Open Space rules.

As well as to study the requirements so that the Triangle Field can be designated as a Green Open Space, namely from the presence of pedestrian paths, vegetation areas, large green areas, and other supporting facilities. So from the conclusions to analyze it, we decided to choose the title "Analysis of the use of green open space in the Triangle Field of LubukPakam City"The research objective is to describe how the implementation of green open space governance in urban development inRegency(Kurniawan et al., 2022; Nurliah & Tajuddin, 2021; Wang et al., 2019). This research uses descriptive analysis and explanation methods. In analyzing the data obtained, researchers used qualitative descriptive techniques that describe and explain the results of the study(Salimi et al., 2020; Sholeha & Harahap, 2023). The results showed that the implementation of green open space governance district is self-managed and is the responsibility of the Regional Work Units (SKPD) in charge of each green open space according to the criteria and types.

## MaterialsandMethods:-

The research methodology used is a qualitative method that collects, analyzes, and interprets non-numeric data. Qualitative research is expressed in words. It is used to understand a concept, thought or experience.

Qualitative data is defined as non-numeric data, such as text, videos, and photos. With case study and ethnographic research methods. In the study of documentation, observation, and interviews Urban green open space is a valuable resource for physical activities of urban inhabitants and has the potential to reduce chronic illness and improve health. Research on the relationships between green open space and physical activity is incomplete and limited in China. Thus, the study examines how the urban green open space contributes to physical activity. Methods: A questionnaire was designed based on the social ecology theory to investigate the physical activity of 513 residents in urban green open space. We use the time and frequency of residents exercising in urban green space to measure physical activity, and use the factor analysis to synthesize a large number of original factors (i.e., infrastructure, safety, accessibility, landscape quality, and space environment) into relatively few composite indicators. Based on the collected data of the cross-sectional population, the Order Probit regression model was constructed to analyze how urban green open space affects the residents' physical activity from the perspective of social ecology. Results: In community factors: Accessibility is significantly positive correlation with residents' physical activity, and there is no significan(Napitupulu et al., 2023).

In determining the strategy for providing green open space based on population, An analysis is carried out, namely a SWOT analysis. SWOT analysis itself is astrategic decision-making process linked to vision, goals, strategy andpolicies that need to pay attention to various aspects related to these factors that influence it.

The strength factor is an advantage that the location already has research related to public green space and the potential that exists in its development and for weaknesses are existing deficiencies related to public green space.

Then the opportunity factor (opportunities) is an external factor that can be exploited for the development of public green open spaces and for threats an external factor that can damage the development of public green space.

### **Results and Discussion:-**

### 1. Eligibility as City Parks in the RTH of LubukPakam District and TanjungGarbus I Village.

For the scope of RTH in LubukPakam District, the area of this park is a minimum of 0.2 m<sup>2</sup> per district resident, with a minimum garden area of 24,000 m<sup>2</sup>. For the scope of RTH TanjungGarbus I Village, the area of this park is a minimum of 0.30 m<sup>2</sup> per urban village resident, with a minimum garden area of 9,000 m<sup>2</sup>. Standard adjustments will be accumulated from the highest and lowest population in whichever year is adequate. Then the following table shows the population census from 2018-2021.

No	Village	Total Population	n (Person)		
		2018	2019	2020	2021

1	Paluhkemiri	3.209	3.270	3.645	3.884
2	Petapahan	2.515	2.565	2.174	2.176
3	Tanjunggarbus 1	3.964	4.039	3.489	3.636
4	PagarMerbau III	4.824	4.916	4.450	4.826
5	Camara	8.476	8.640	7.779	8.107
6	PasarMelintang	7.761	7.918	6.772	6.876
7	Pagarjati	7.468	7.613	6.711	6.852
8	Syahmad	4.113	4.193	4.497	4.642
9	Lubukpakam III	5.118	5.224	4.135	4.316
10	Lubukpakampekan I/II	8.087	8.256	6.680	7.195
11	LubukPakamPekan	9.576	9.772	7.131	73.83
12	Bakaranbatu	11.472	11.691	11.174	11.305
13	Sekip	21.413	21.830	19.939	20.642
	Total	97.996	99.927	88.576	91.840

**Table 1.1:-** Population of LubukPakam City 2018-2021.

No	Category	Cross- sectional area	Field data	Appropriateness
1	RTH KecamatanLubukpakam	24.000 m <sup>2</sup>	17.500m <sup>2</sup>	Not feasible
2	RTH KelurahanTanjungGarbus 1	9.000 m <sup>2</sup>	17.500m <sup>2</sup>	Worthy

Table 1.2 The results of the minimum land area feasibility analysis

Furthermore, the discussion regarding the feasibility of the number of residents with land area, namely:

1. RTH LubukPakam District

- Most population

A reference of  $0.2m^2$  per inhabitant for the 2018-2021 period, the highest total population will be in 2019. So what will be accumulated is the population in 2019 with a total of 99,927 people.

 $0.2m^2$ / person x 99,927 person = 19,985.4  $\approx$  19,986m<sup>2</sup>

- The smallest population

Reference  $0.2m^2$  for per resident for the period 2018-2021, the smallest total population is in year. So what will be accumulated is the population in 2020 with a total of 88,576 people.

 $0.2m^2$ / person x 88,576 person = 17,715.6  $\approx$  17,716m<sup>2</sup>

2. RTH TanjungGarbus I Village

- Most population

The reference is 0.30 m2 per inhabitant for the period 2018-2021, the highest total population will be in 2019. So what will be accumulated is the population in 2019 with a total of 4,039 people.

 $0.30m^2$ / person x 4,039 person = 1,211.7  $\approx$  1,212m<sup>2</sup>

- The smallest population

Reference 0.30m<sup>2</sup> for per resident for the period 2018-2021, the smallest total population is in year. So what will be accumulated is the population in 2020 with a total of 3,489 people.

 $0.30m^2$ / person x 3,489 person = 1,046.7m<sup>2</sup>  $\approx$  1,047m<sup>2</sup>. From the analysis study, the feasibility is:

No	Category RTH	Most	Smallest	Total Acumulation and eligibil	
		Population		Much	Little
1	RTH KecamatanLubukPakama	99,927 (2019)	88.576 jiwa	19.986 $m^2$	$17.716 m^2$
			(2019)	(tidaklayak)	(worthy)
2	RTH KelurahanTanjungGabus 1	4.039 (2021)	3.489 jiwa	1.212 m <sup>2</sup>	$1.047 \text{ m}^2$
			(2020)	(worthy)	(worthy)
No	Category RTH	Most	Smallest	Total Acumulation	and eligibility
		Population		Much	Little
1	RTH KecamatanLubukPakama	99,927 (2019)	88.576 jiwa	19.986 $m^2$	$17.716 m^2$
			(2019)	(tidaklayak)	(worthy)
2	RTH KelurahanTanjungGabus 1	4.039 (2021)	3.489 jiwa	1.212 m <sup>2</sup>	$1.047 \text{ m}^2$
			(2020)	(worthy)	(worthy)

## **Table 1.3:-** The results of the feasibility analysis of the accumulated population.

## 2.Feasibility of vegetation according to function

Analysis of vegetation as a function of ecological conditions in the Triangle Field, ie

No	Fungtion	Vegetation				
		TinggiPohon	Jarak	JenisPohon	BentukPohon	PolaPohon
1	Shading	Min 2m>5m	Dense	Big trees	That don't bend	Line up
2	Air Absorption	Min 2m>5 m	Dense	Big trees	That don't bend	Line up
3	Noise Supretion	Min 2m>5m	Dense	Big trees	That don't bend	Line up
4	Wind breakers	Min 2m>5m	Dense	Big trees	That don't bend	Line up
5	Visibility	Min 2m>5m	Dense	Big trees	That don't bend	Line up
6	Glare with vehicle	Min 2m>5m	Dense	Big trees	That don't bend	Line up
7	Pedestrians	Min 2m>5m	Dense	Big trees	That don't bend	Line up
8	Crossroads	Min 2m>5m	Dense	Big trees	That don't bend	Line up

 Table 1.4:- Results of vegetation feasibility according to function.

To examine the results of the vegetation function, some data is examined, namely:



Figure 1.1:- Analysis of tree heights

So from the analysis of vegetation from several angles in this triangular field,

1. The tallest tree reaches 6 meters and the shortest 0.3 meters.

## 2. Trees with dense tree mass

3. Tree pattern lined up and tight

No	Fungtion	Vegetasi					
		Min Pohon	Max Pohon	Jarak	Jenispohon	Bentukpohon	Polapohon
1	Shading	Not feasible	worthy	worthy	worthy	worthy	worthy
2	Air	Not feasible	Worthy	worthy	worthy	worthy	worthy
	Absorption						
3	Noise	Not feasible	Worthy	worthy	worthy	worthy	worthy
	Supretion						
4	Wind	Not feasible	worthy	worthy	worthy	worthy	worthy
	breakers						
5	Visibility	Not feasible	worthy	worthy	worthy	worthy	worthy
	-		-	-	-	-	-
6	Glare with	Not feasible	worthy	worthy	worthy	worthy	worthy
	vehicle		-	-	-	-	-

## From the results of the analysis studied in the field, the results of the analysis study are:

Table 1.5:- Feasibility Results of tree shapes

## 3. Eligibility of pedestrian paths

The results of the vegetation analysis earlier, will then proceed to the analysis of pedestrian pths. Standard provisions for pedestrian paths have been included in the RTH Law, in the form of:

- 1. There are visual signs to make it easier to remember pedestrian paths
- 2. Convenience for users, such as no roadblocks and lane access for the disabled
- 3. Sidewalk width min. 2 meters
- 4. Shrubs/ground cover min. 1 meter
- 5. Vegetation protection from the pedestrian path to the vehicle lane min. 4m

From the standards that have been used as guidelines from Law U No. 05/PRT/M/2008 regarding Green Open Space, produces analyzes to be studied, namely:



Figure 1.2:- Size analysis in the field.

Building visuals to make it easier for pedestrians to remember the Triangle Square, namely:

1. Empty building in the middle of a field

2.



**Figure 1.3:-** Visual analysis of an empty building in the middle of a field 3. Building in a public cemetery



Figure 1.4:- Visual analysis of empty buildings near public cemeteries.4. The Bank of North Sumatra monument at the end of the triangular field



Figure 1.5:- Visual analysis of the Bank of North Sumatra monument.

No	Kategori	Kelayakan
1	Visuals in the field to make it easier to remember the	worthy
	conditions in the field	
2	Unobstructed pedestrian path in the middle of the road	worthy
3	There is a pathway for the disabled	worthy
4	Pavement width	worthy
5	Ground cover width	worthy
6	The width of the vegetation that protects the pedestrian path	Not feasible
	from the vehicle lane	

The analysis studied resulted in an analytical study of pedestrian paths, namely:

Table 1.6:- Results of Analysis of Pedestrian Paths

## 4. Funeral Eligibility

In achieving the feasibility of green open space, certain functions, namely the cemetery which is actually in the Triangle Square. There are several requirements to achieve functional eligibility, namely:

- 1. Grave size 1 m x 2 m;
- 2. The distance between one grave and another is at least 0.5 m;
- 3. Walling/pavement is not permissible for each grave;
- 4. Cemeteries are divided into several blocks, the area and number of each block are adjusted to the conditions of the local cemetery;
- 5. The boundary between the burial blocks is in the form of a 150-200 cm wide pedestrian with a row of shade trees on one side;
- 6. The outer boundary of the cemetery is in the form of a hedge or a combination of artificial fences and hedges, or with protective trees;
- 7. Cemetery green space, including cemeteries without pavement, at least 70% of the total cemetery area with a vegetation coverage level of 80% of the green space area.

In order to find out the fulfillment of the requirements, several analyzes in the field are carried out, namely:



Figure 1.6:- Analysis of the size of the tomb.



Figure 1.7:- Analysis of Public Cemeteries.

No	Kategori	Kelayakan			
1	The size of the tomb is 1m x 2m	worthy			
2	The distance between the tombs 0.5	worthy			
3	Each tomb is not allowed to be walled	worthy			
4	There is a block	worthy			
5	Boundary between blocks 1.5m-2m	worthy			
6	Boundaries are made with fences or plants	worthy			
7	Green space min 70%	worthy			

Then the results of the analysis, namely:

Table 1.7:- Results of analysis of public cemeteries.

## 5. Feasibility of Energy Utilization

Increased reliability in grid-independent photovoltaic systems is an important factor in the prevalence and greater use of solar systems. The present study was conducted in Iran. It is one of the countries with high potential in the field of solar energy with average radiation of  $5-5.5 \text{ kWh/m}^2$  intensity. On the other hand, due to the wide desert areas, it is important to investigate the effect of dust deposition on photovoltaic panels. An experimental study on the performance of photovoltaic panels over a 90-day period from May 25 to August 22, 2018, in Tehran, and under real conditions, to investigate the effect of dust deposition and climate change on their output power was performed. Because of its large population, political and economic conditions, Tehran has the highest importance amongst other cities in Iran. The results showed that the dirty panels produced 10% less power than the clean panels. Utilization of the data achieved from the experiment, the output power of the clean and dirty panels considering the air temperature and solar radiation is modeled using the MLR method. In order to establish the relationship between the

reductions of the output power of the panel, due to the deposition of walnut dust, the soiling ratio (SR) is used. This ratio is gained by dividing the output power of the dirty panel by the output power of the clean panel to obtain a coefficient to determine the reduction of the output power of the desired photovoltaic panel in terms of air temperature and solar radiation. The coefficient earned with the correlation coefficient of 0.9 (R2) and the error of the mean root squares 7.94 (RMSE) can well predict the loss of power output of the panel due to dust sediment on the surface of the panel. The uncertainty range of experimental results is between of 7.83% to 8.08%.

The tool used to convert sunlight into electrical energy and increase the temperature of solar cells is called a Solar Panel. To convert solar energy into electrical energy, photovoltaic modules are needed. One aspect that effects is the intensity of light. One of the influential aspects of the conversion is the light intensity. The intensity of this light is directly proportional to the value of electrical energy. The greater the light intensity, the greater the energy value produced by the panel and vice versamore light intensity, the more electrical energy the solar panel gets and vice versa. The solar panel will be optimal when exposed to direct sunlight. Optimization of electricity value using flat mirrors as reflector expected directly more sunlight radiation falling on to the surface of the photovoltaic panel flat mirror aims to focus light on the photovoltaic panel. The greather the light received by the flat mirror glass, the higher the output power by the output power obtained by the photovoltaic panel. The calculation of the voltage and current of the solar panel is affected by the suns temperature which has an impact on the performance of thephotofoltaic panel where the difference in the output, photovoltaic panel without using a reflector is 2.31.

### 6. The discomfort felt by residents using the Triangle field.

- 1. The condition of the play area is no longer proper, from rusted iron, faded or faded colors, and scattered trash.
- 2. Garbage burning area which is close to the play area, this disturbs comfort which creates air pollution.
- 3. Damaged trash cans
- 4. The iron in the fitness area is rusty
- 5. Scattered chairs
- 6. Ruined picnic area

## **Conclusions:-**

The analysis resulting from the title "Analysis of the Use of Green Open Space in the Triangle Field of LubukPakam City", from the analysis studied gives the feasibility and ineligibility results in the Triangle Field.

So from the analysis that has been described, the results of the study are as follows:

From the results of the feasibility applied in accordance with the Law on Green Open Spaces. As for the matters studied regarding feasibility from the community's point of view from the results of the questionnaire. That is:

- 1. Vegetation is unable to muffle the noise
- 2. The condition of the play area is no longer proper, from rusted iron, faded or faded colors, and scattered trash.
- 3. Garbage burning area which is close to the play area, this disturbs comfort which creates air pollution
- 4. Condition of trash cans that have been damaged
- 5. The iron in the fitness area is rusty
- 6. Scattered chairs
- 7. Ruined picnic area

Discomfort from the facilities from the Triangle Field, as for suggestions that can be considered in dealing with discomfort in the facilities, namely:

### The Government

- 1. Improving the condition of the play area that is no longer proper, from rusted iron, faded or faded colors, and scattered trash.
- 2. The garbage that is in the Triangle Square should only be collected in the disposal center area.
- 3. Condition of trash cans that have been damaged repaired or replaced with new ones
- 4. The iron in the fitness area is rusty, replaced or covered with rusty iron by painting it.
- 5. Scattered chairs should be stored in the warehouse
- 6. The picnic area must be repaired, because sharp cracked tiles can injure picnic area users.
- 7. Adding workers to take care of the Triangle Field environment will keep it clean from garbage and maintain the quality of each facility.

- 8. Taking into account the land area as the population increases, the government must also start planning to make other green open space in the LubukPakam area besides the Triangle Field.
- 9. Provide sufficient funds for facility improvement.
- 10. Adding land functions to the maximum.

## **Community side**

- 1. Maintaining public facilities after they are used, because green open space is shared property, it should be guarded.
- 2. Spark creativity by unlocking events that can improve the quality of the Triangle Court
- 3. Do not damage the existing vegetation in the Triangle Field area, because what already exists in the Triangle Field must have been carefully planned by the architect who takes care of this landscape.
- 4. Working with the government to build the Triangle Square.

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