DETERMINATION OF THE BEST LOCATION GARDEN OF PUBLIC READING (TBM) IN SURABAYA USING THE METHOD ANALYSIS *OVERLAY* AND AHP

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ABSTRACT

The growth of organizations in the field of literacy is very good for the development of children's interest in reading and insight at an early age, especially in the city of Surabaya. Taman Bacaan Masyarakat (TBM) is an organization that has an important role to support and facilitate the community in seeking knowledge in the field of literacy in particular. The addition of TBM in Balai RW, Kelurahan, Kecamatan, and in the corners of community crowds is a tangible manifestation of the role of the Surabaya City Library and Archives Service as the authority that intersects directly in the field of literacy to facilitate the reach of the public in finding quality sources of information. However, several technical factors influence the selection of TBM addition locations that are still very objective. And the limited budget for the establishment of TBM also affects the number of TBM founding locations.

Keywords: Best Location Selection, Community Reading Gardens, Overlay Analysis, AHP

1. INTRODUCTION

Taman Bacaan Masyarakat (TBM) itself is one of the government programs referring to the Law of the Republic of Indonesia Number 20 of 2003 concerning the National Education System, article 26 paragraph (4), it is stated that non-formal education units consist of course institutions, training institute, study groups, community learning centers, majelis taklim, and similar education units. There are many problems when the placement of Taman Bacaan Masyarakat is not considered to have met the performance of the target community in advancing literacy culture in the environment the. For example the location the is a less strategic location to be made Taman Bacaan Masyarakat because the place is too narrow or the place is inadequate to be a Community Reading Park, it could also be that place veiled into alleys so the reach is too far for people who want to enjoy the facilities. A solution program is needed to determine the location of TBM so that the spread of TBM procurement is targeted. One of the options is to create the best TBM location determination system in Surabaya using overlay analysis and AHP methods.

2. BASIC THEORY

This research was divided into 5 stages, namely Analysis

Needs The design System, Implementation, Integration and Testing, *Operation and Maintenance.*

a) Needs Analysis

Retrieval of data sources for filing locations and supporting data for filing the procurement of the location of Community Reading Gardens (TBM) from all districts in the city of Surabaya.

b) System Design

The design of the design system aims to facilitate visual images that have been completely modeled at the requirements analysis stage. The design of the application program flow uses the system Flowchart, DFD (Data Flow Diagram) and ERD (Entity Relationship Diagram).

c) Implementation

In this stage programming is done. For alternative data filters using ArcGis software in creating map layers. Making the AHP method application using language PHP Native and the database using Mysql Database.

d)* Integration and *Testing

The process of combining the modules that have been made and testing the program. The system testing process applies black-box testing to see what percentage of error rate.

e) Operation and Maintenance

Finished software is run and done

Maintenance Maintenance included in fixing errors that were not found in the previous step. To determine a suitable location to be used as TBM system needs analysis is needed, both in the form of data analysis and verbal analysis of

Figure 2.1. Arcgis System Flowchart

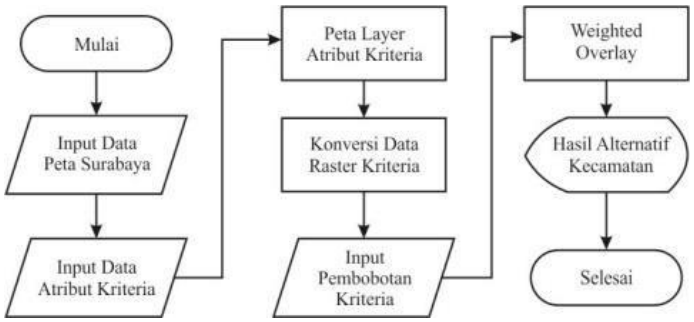

Figure 2.2 AHP System Flowchart

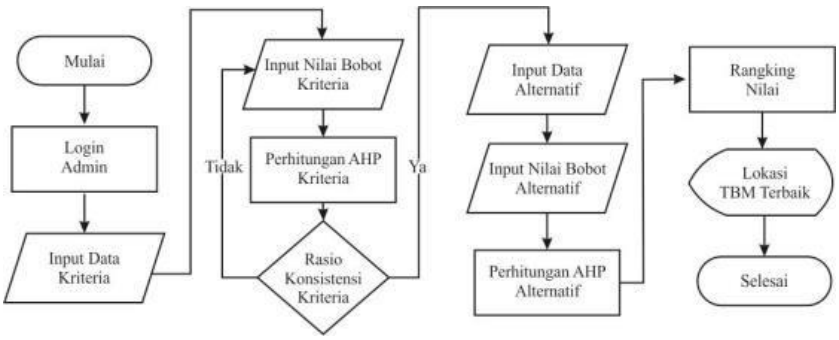

Figure 2.3 Flowchart AHP System

3. METHODOLOGY

Initial map data is data that shows an object on the surface of the earth such as the shape of the island and administrative boundaries with SHP format data (ArcGIS). The contents of the data are in accordance with the appearance in the map source which is digitized in the administrative boundaries of the sub-district in the city of Surabaya. Then the map will be grouped into sub-district area uses Dissolve Geoprocess.

Figure 3.1 Map of Surabaya District

Someone who qualified in their field. The TBM selection system to be made is using 2 work methods. First the data will be in analysis use the system *weighted overlay* geographic information system, then the results of the analysis will be processed into AHP calculations to determine the best location. Analysis *weighted* Maps that already contain attribute data will be converted into raster data. Raster data is data that is stored in the form of rectangular boxes (grids) / cells to form a regular space. In raster. *overlay* includes data collection, data processing, and process. *Overlay* using ArcGis software. Then the AHP calculation includes the design of the system interface design and the AHP calculation process.

called pixels (picture elements).

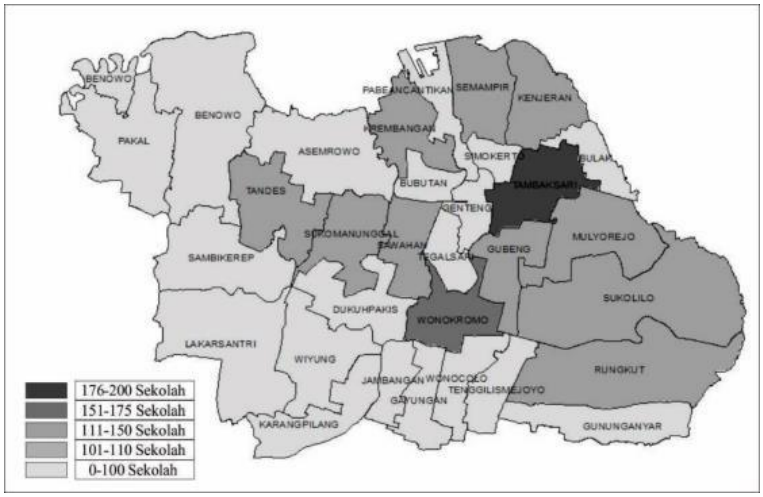

Figure 3.2. Raster Map Number of Schools

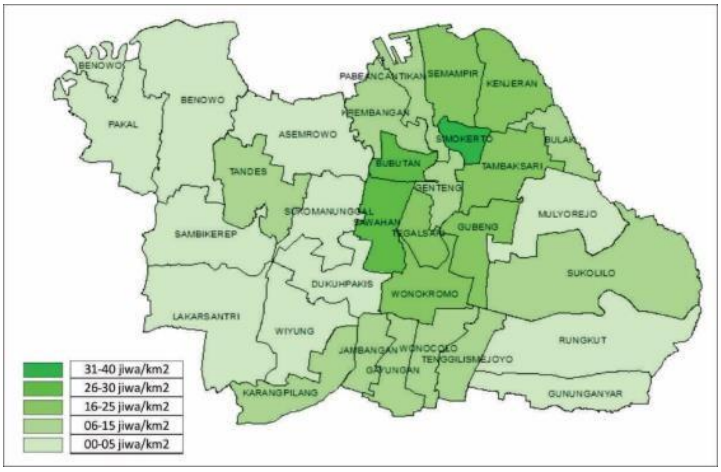

Figure 3.3 Map of Population Density Raster

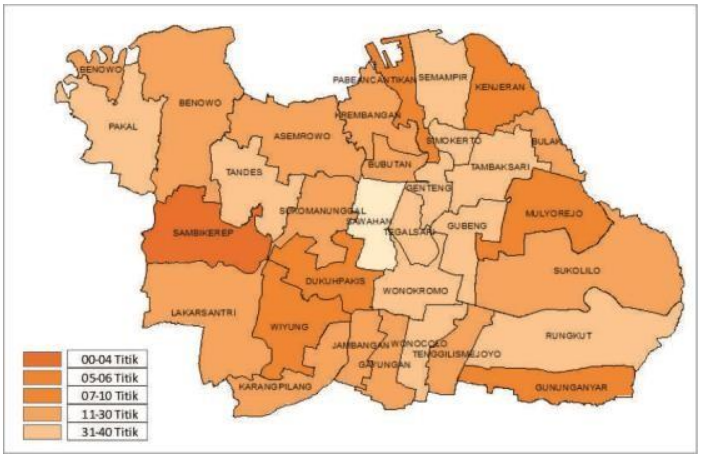

Figure 3.4 Raster Maps Read Services Availability

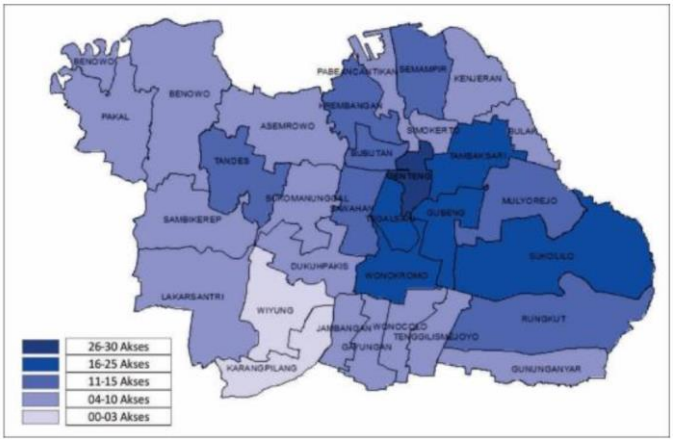

Figure 3.4 Raster Map Access to Location

System *weighted overlay* is an overlapping operation (*overlay)*, in the process of overlapping operations is a process of pooling spatial data that has been converted into raster data.

$$WO = \Sigma (inRast * influence)$$

With information:

Wow *: Weighted Overlay*
inRast : Raster value criteria
Influences : Criteria Weight

3.1 AHP

AHP is used to derive the ratio scale from several discrete or continuous pair comparisons. Pairwise comparisons can be obtained through actual and relative measurements of degrees of preference, or interests or feelings. Thus this method is very useful to help get the ratio scale of things that were difficult to measure such as opinions, feelings, behavior and beliefs. If it is known that the value of the comparison of the Ai element to the Aj element is aij, then theoretically the matrix is positively reciprocal in character ie aji = 1⁄ aij. Before heading to the ratio consistency, the calculation is continued by connecting the 'weight vector' (w) with the matrix A with the equation:

$$Aw = A. w$$

With information:

Aw *: Eigen Multiplication Results*
A : Matrix
W : Vector Weight.

Then find the Eigen Value by summing all the product of the matrix multiplication and the weight then divided by the number n:

$$\alpha \max = \frac{\sum \alpha}{n}$$

a max *: Eigen Value*
∑a : Multiplication Matrix
n : Order of the Matrix

Test Consistency Index and Ratio Determination of the consistency of the matrix itself is based on the maximum eigen value.

$$CI = \frac{(\lambda \max - n)}{n-1}$$

With information :

CI = Consistency deviation ratio.

λ max = The largest eigenvalue of the matrix with Ordo n

n = Orde of the Matrix

If the CI value is zero, then the pairwise comparison matrix is consistent. The inconsistency limit set by Thomas L. Saaty is determined using the Consistency Ratio (CR),that is comparison index consistency with the random index value (IR). The Consistency Ratio can be formulated as follows:

$$CR = \frac{CI}{IR}$$

With Information :

CR = Consistency Ratio

IR = Random Index

CI = Consistency Index

After obtaining all data from all respondents, the next step is to analyze the data by determining the global weight. If there are sub criteria by each alternative, an alternative ranking result is carried out in each criterion. The equation for calculating the total score of criteria against alternatives is as follows:

$$S_j = \sum_i (S_{ij})(W_i)$$

With Information :

Sij = Alternative weight results in each criteria

Wi = Criteria Weight

4. TEST AND RESULT

Weighted overlay system is an overlay operation, in the process of overlapping operation is a process of integrating spatial data that has been converted into raster data, from 4 raster criteria data will be overlaid to make a single map.

Table 4.1 The calculation results *Weighted Overlay*

KECAMATAN	HASIL WEIGHTED OVERLAY
Asemrowo	1,5
Benowo	1,5
Bubutan	2,5
Bulak	1,8
Dukuh Pakis	1,7
Gayungan	1,8
Genteng	1,9
Gubeng	2,9
Gunung Anyar	1,7
Jambangan	1,8
Karangpilang	1,7

Kenjeran	2,8
Krembangan	2,7
Lakarsantri	1,5
Mulyorejo	2,6
Pabean Cantian	2
Pakal	1,3
Rungkut	2,2
Sambikerep	1,9
Sawahan	2,9
Semampir	2,8
Simokerto	2,5
Suko Manunggal	2,8
Sukolilo	2,3
Tambaksari	3,7
Tandes	2,5
Tegalsari	2,1
Tenggilis Mejoyo	1,8
Wiyung	1,6
Wonocolo	1,6
Wonokromo	3,3

Interval class will be determined based on the division of existing values into classifications of equal magnitude (equalinterval). From analysis Overlay produces 3 value classifications, namely:

Table 4.2 Classification of Results *Weighted Overlay*

Value	Classification	WEIGHTED OVERLAY RESULTS
3	Very decent	3 <4
2	Decent enough	2 <3
1	Not feasible	1 <2

from the results of the classification there are 2 alternative locations that are very feasible to establish TBM namely:

Table 4.3 The Best Location Analysis Results

NO	BEST LOCATION
1	WONOKROMO
2	TAMBAKSARI

Figure 4.4 Results Map *Weighted Overlay*

From the results of the 2 best Kecamatan locations, the 2 Subdistricts have submitted the realization of TBM 5 Alternative locations that will be processed using the AHP method.

Table 4.5 The Best Location Analysis Results

NO	KECAMATAN	LOKASI TBM
1	WONOKROMO	RW 6 Sawunggaling
2		RW 3 Ngagelrejo
3	TAMBAKSARI	RW 1 Dukuh Setro
4		RW 2 Dukuh Setro
5		RW 4 Dukuh Setro

After the analysis gets the results,then do the next process they are AHP, For the first AHP Process is Determine of the first weight of each criterion. then process is to determine the initial weighting of each predetermined criterion.

1.C1 = Room
2.C2 = Inventory & Facilities
3.C3 = Air Circulation
4.C4 = Location Access

then the AHP calculation includes manufacturing table pairwise comparisons, percentage of criteria, multiplication of comparisons to calculation of the consistency of values. Here are the results of the AHP calculation on the criteria Table 4.6 :

Table 4.6 Presentation Value e weights Criteria

Criteria	Weight	Percentage
Room	0.58	58%
Inventory & Facilities	0.25	25%
Air Circulation	0.12	12%
Location Access	0.05	5%

From the whole AHP calculation process, it will produce 1 location chosen to be the location where TBM is established. RW 6 Sawunggaling gets a grade the highest of another alternative TBM location

Tabel 5.2 Value calculated an alternative criteria

Alternative	Weight	Percentage
RW 6 Sawunggaling	0.38	38%
RW 3 Ngagelrejo	0.20	20%
RW 1 Dukuh Setro	0.16	16%
RW 2 Dukuh Setro	0.17	17%
RW 4 Dukuh Setro	0.10	10%

From the calculation above it can be seen that the best location for submitting TBM is RW 6 Sawunggaling in Wonokromo District with a percentage value of 38%.

5. CONCLUSION

1. In the overlay analysis process using the program ArcGis produces 2 of the best Districts out of a total of 33 Sub-districts in Surabaya namely Wonokromo and Tambaksari Sub-districts, the results of the sub-district contain 5 alternative TBM locations, namely:

   A TBM RW. 06 Sawunggaling (Wonokromo)
   B TBM RW. 03 Ngagel Rejo (Wonokromo)
   C TBM RW. 01 Hamlet Setro (Tambaksari)
   D TBM RW. 02 Hamlet Setro (Tambaksari)
   E TBM RW. 04 Dukuh Setro (Tambaksari)

2. In the AHP calculation process there are 5 alternatives TBM locations out of a total of 36 alternative submission locations by Musrenbang, the results of the process resulted in the best location, namely TBM RW. 06 Sawunggaling (Wonokromo).
3. After doing a series of testing results in chapter previous, testing on AHP program using 5 to alternatives shows the results of the calculation of the best location TBM has an accuracy value of 99.4%

Tabel 5.3 Test Results

Hasil	Presentase Akurasi Hasil (%)		
	5 Alternatif	6 Alternatif	7 Alternatif
	99%	99,80%	99,50%
Average	99,40%		

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