

Geographical Information System of Slums Area in Tangerang Selatan City

N R Radliya^{1*}, R Fauzan², A R Rabbi³

^{1,2}Department of Information System, Universitas Komputer Indonesia, Indonesia

³Department of Population and Environmental Education, Universitas Siliwangi, Indonesia

Email : *nizar@email.unikom.ac.id

Abstract. The increasing rate of population growth in South Tangerang City has not been matched by the availability of housing that can be reached by all groups of people. These conditions triggered the emergence of slums that were built with minimal conditions without regard to spatial structure and good building construction. The purpose of this research to classify slum settlements based on government regulations which later information is presented through media information systems geographical. The analysis tool in this study uses descriptive statistics to get the characteristics of slums in the downtown area of Tangerang Selatan. Descriptive statistical analysis is done by processing the results of the questionnaire into tables, diagrams, percentages, and graphs and comparing them with applicable regulations or standards. Data generated from the analysis process will be presented in the form of geographic information systems. Based on the analysis conducted there are 3 levels of slums. The mild slum level consists of 100 regions, the moderate slum level consists of 34 regions, and the heavy slum level consists of 2 regions.

1. Introduction

Slums are a problem faced by almost all cities in Indonesia, even some cities in other developing countries [1]. Slums are considered urban diseases that must be treated. Population growth is the main factor that drives the growth of slums because it is not matched by the availability of housing that can be reached by all groups of people [2]. Slums are a product of poverty growth and a lack of government in controlling growth and providing adequate urban services. Settlements are declared slum based on aspects set out in the Republic of Indonesia Government Regulation No. 14 of 2016. These aspects are the condition of buildings, road conditions, conditions of water supply, drainage conditions, wastewater management conditions, waste management conditions, and fire protection conditions.

Slums will continue to develop if they continue to be neglected and the impact on the quality of life of the poor is getting lower [3]. Slum areas also have an impact on the quality of health, crime, and community area disasters. This research was conducted at the South Tangerang City Housing and Settlements Department. So far the government is still constrained in getting information related to the extent of the slums in the city of South Tangerang [4]. This study aims to obtain information on the level of slums in each region by conducting surveys directly in the field. The survey was conducted with the help of a questionnaire based on aspects and slum criteria. The data obtained were entered into the application developed in this study. The application developed is a web-based GIS (Geographic



Information System) application. GIS is an information system that has the ability to build, store, manage and display information in the form of spatial data that is equipped with attribute data.

The purpose of this research to develop a GIS application that can display information on the level of slums in every region in the city of South Tangerang. This information can be used by the government in overcoming slums in the community. The level of slums in each region in the application will continue to be updated along with countermeasures implemented by the government.

2. Methodology

The system approach used in this study is the object-oriented approach method. This method is an approach technique that views the system as a collection of objects that interact with each other and has a role based on the function of each object [5]. This study also uses a system development method, namely RAD (Rapid Application Development). The RAD method is presented in Figure 1.

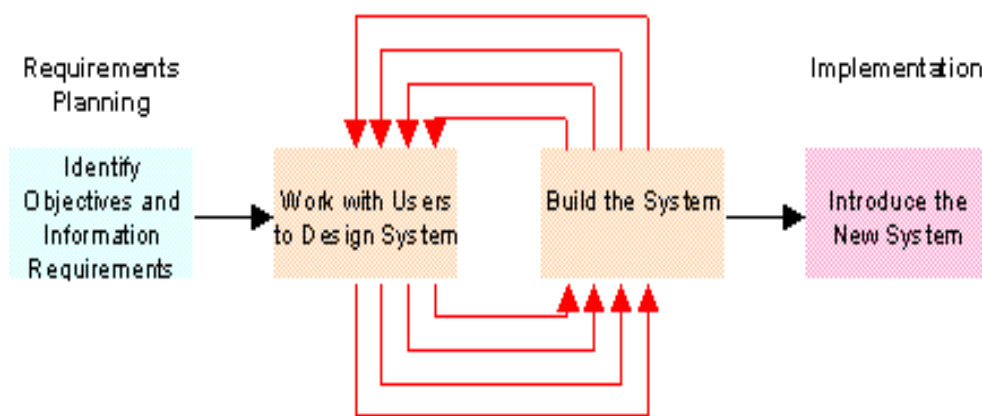


Figure 1. RAD (Rapid Application Development) [5]

The RAD method is a model of a software development process that is classified as an incremental (multilevel) technique that emphasizes a short, fast development cycle. The RAD method uses an iterative method in developing systems in which the working model of the system is constructed at the beginning of the development phase with the aim of determining user needs [5]. The research procedure is based on the system development methods used. The research procedure in this study is presented in Figure 2.

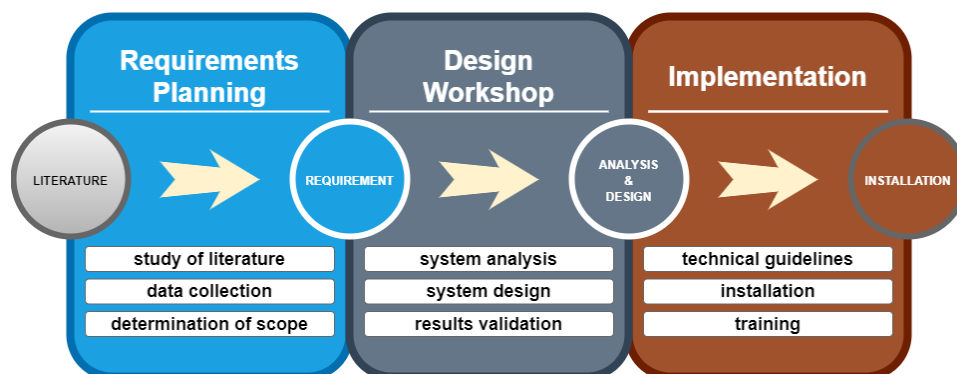


Figure 2. Research procedure

2.1. Phase I: Requirements Planning

At this stage, a preliminary study of research is carried out to determine the scope of the study. This stage begins by understanding the characteristics of slums based on literature studies, the results of which

are implemented in the form of questionnaires. At this stage also made the basic map of the administrative boundaries of the city of southern Tangerang for the needs of geographic information systems.

2.2. Phase II: Design Workshop

This stage is done by collaborating with users in implementing application development. The stages are carried out repeatedly, until the conditions that the application has been agreed by the user [6,7].

2.3. Phase III: Implementation

This stage begins by defining technical guidelines for hardware (Computers / Servers and Networks) for the use of applications that comply with system requirements and requirements. Next, install the application by uploading the application and database to the VPS server (Virtual Private Server). The introduction and use of the application are also carried out at this stage.

3. Result and Discussion

3.1. System Analysis

Slum level analysis is done by conducting a survey in each region determined by the government. The number of areas surveyed for each district is presented in Table 1.

Table 1. Number of survey areas [7]

Sub-district	The region
Serpong Utara	43
Pondok Aren	39
Serpong	32
Ciputat	23
Setu	28
Pamulang	61
Ciputat Timur	12

Slum level data for each region is important to support the government in carrying out slum management activities [8]. The questionnaire used to assess the level of slumness of each region was made based on aspects set out in the Government Regulation of the Republic of Indonesia Number 14 of 2016 [9]. The aspects and criteria of the level of the slum are presented in Table 2.

Table 2. Slum area aspects and criteria [9]

Aspect	Criteria
Building Conditions	5
Environmental Road Conditions	3
Conditions for Drinking Water Supply	5
Condition of Environmental Drainage	8
Wastewater Management Conditions	5
Waste Management Conditions	5
Fire Protection Conditions	2

The survey activity was aimed at collecting data on areas that indicated slums and houses and residents in the city of South Tangerang. Data collected through surveys will be adjusted to spatial data. This stage is done using a GIS application, namely ArcMap. GIS has the ability to analyze, store and map spatial data and integrate with attribute data that can inform phenomena that exist at each location on the map [10].

3.2. System Design

Modeling the application monitoring design uses a use case diagram in Figure 3. The use case diagram serves to show the interaction between the system and the actor/user [6].

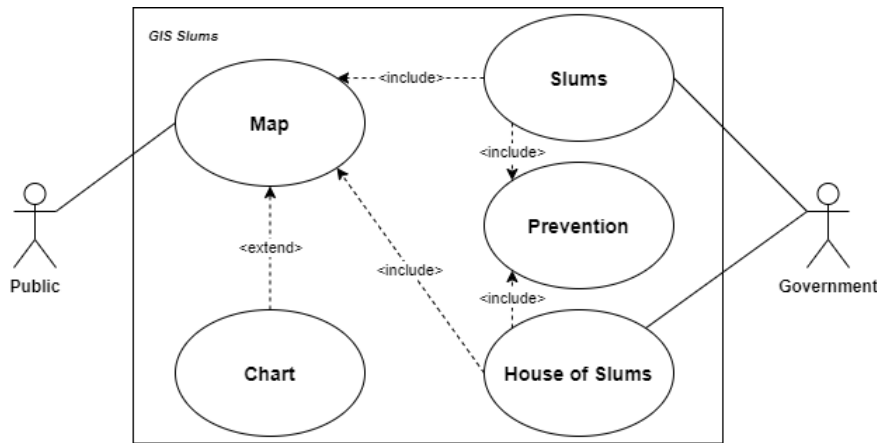


Figure 3. Use case diagram of GIS slums

Use Case diagram is a diagram that can briefly model system users and functions/services provided by the system [11]. The use case description of GIS slums is presented in Table 3.

Table 3. Use case description

Use Case	Description	Actor
Slums	The results of the data collection of slums are included in the application, including the creation of a regional polyline.	Government
House of Slums	Results of slum dwelling data are entered into the application including the creation of residential map points.	Government
Prevention	Every treatment program carried out for the area or residence is included in the application and will automatically change the level of slums.	Government
Map	Maps of slums are presented online to show the level of slums in each region.	Public, Government
Chart	The slum level graph for each region can be seen through the application.	Public, Government

3.3. Development of GIS Slums

GIS slum presentation in the form of tables, statistical and visual graphs can provide more value in the system so that the process of providing assistance can be more controlled and targeted [12]. GIS slum in the city of South Tangerang is built based on web technology and is online. The application login in Figure 4 is done for government users.



Figure 4. Application public display

The application login process can be done by clicking on the menu in the upper right corner on the initial appearance of the application. Slum data can be managed through the application. Slums are started by making a map of the RT area. After that, the RT area data was added to the survey results regarding the level of the slum. The slum area page is presented in Figure 5.

Kawasan RT GIS Kawasan Kumuh Kawasan RT

2019 + Tambah

Show 10 entries Search:

#			Kawasan	Kecamatan	Keturahan	RT
1			01/01 PONDOK JAGUNG	SERPONG UTARA	PONDOK JAGUNG	01
2			02/01 PONDOK JAGUNG	SERPONG UTARA	PONDOK JAGUNG	02
3			04/01 PONDOK JAGUNG	SERPONG UTARA	PONDOK JAGUNG	04
4			05/02 PONDOK JAGUNG	SERPONG UTARA	PONDOK JAGUNG	05
5			06/02 PONDOK JAGUNG	SERPONG UTARA	PONDOK JAGUNG	06
6			08/02 PONDOK JAGUNG	SERPONG UTARA	PONDOK JAGUNG	08
7			13/05 PONDOK JAGUNG	SERPONG UTARA	PONDOK JAGUNG	13

Figure 5. Slum data

Slum dwelling data can be managed through the application. Data obtained from slum dwellings survey results regarding the assessment of the level of slums. The slum dwelling data page is presented in Figure 6.

#	Nama	Kecamatan	Kelurahan	RT	RW
55	Sarnata	PONDOK AREN	PONDOK KACANG TIMUR	03	02
54	Samsuri	PONDOK AREN	PONDOK KACANG TIMUR	01	02
52	Samad	PONDOK AREN	PONDOK KACANG TIMUR	04	03
46	Rohman	PONDOK AREN	PONDOK AREN	03	11
39	Rohadi	PONDOK AREN	PONDOK AREN	01	08
40	Re Martin	PONDOK AREN	PONDOK AREN	01	09
29	Rahmat	PONDOK AREN	PARIGI LAMA	04	05

Figure 6. House of slums data

The ease of accessing slum information can support the control activities and assistance programs carried out by the government [13]. Handling programs for each slum can be included in the application and will automatically update the level of slums for each region. The handling program page is presented in Figure 7.

#	Jenis Penanganan	Program Penanganan	Kegiatan Penanganan	Volume
1	KONDISI PROTEKSI KEBAKARAN	Penyelenggaraan Penanganan Kawasan Kumuh	Pengadaan Proteksi Kebakaran	1

Showing 1 to 1 of 1 entries

Jenis Penanganan:

Program Penanganan:

Kegiatan Penanganan:

Figure 7. Slum prevention

Map of the slums in the city of South Tangerang can be seen through the application. This menu also provides map printing and search functionality for each region. A map of the slums in the city of South Tangerang is presented in Figure 8.

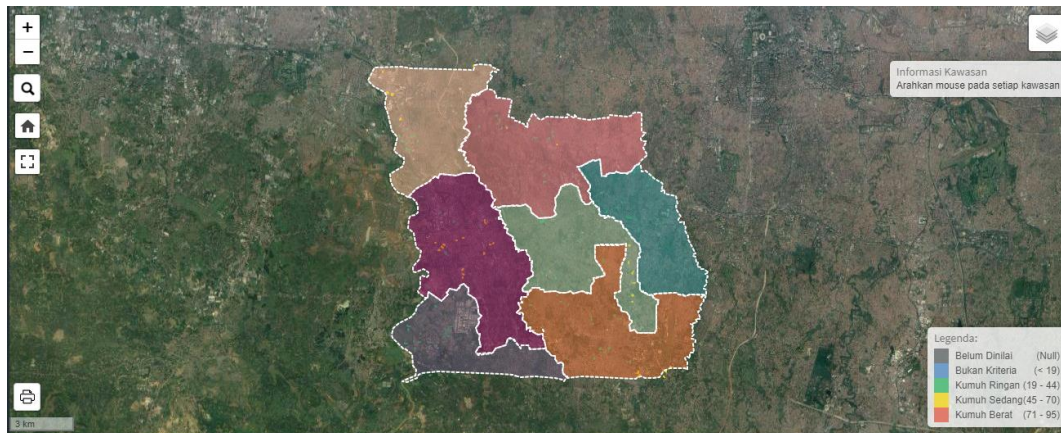


Figure 8. Slum map

Data on slum areas can be presented in graphical form. The available charts are graphs related to the level of the slum for each region and overall. Determination of the level of slums in Indonesia consists of mild slums, moderate slums and severe slums [14]. The slum area graph is presented in Figure 9.

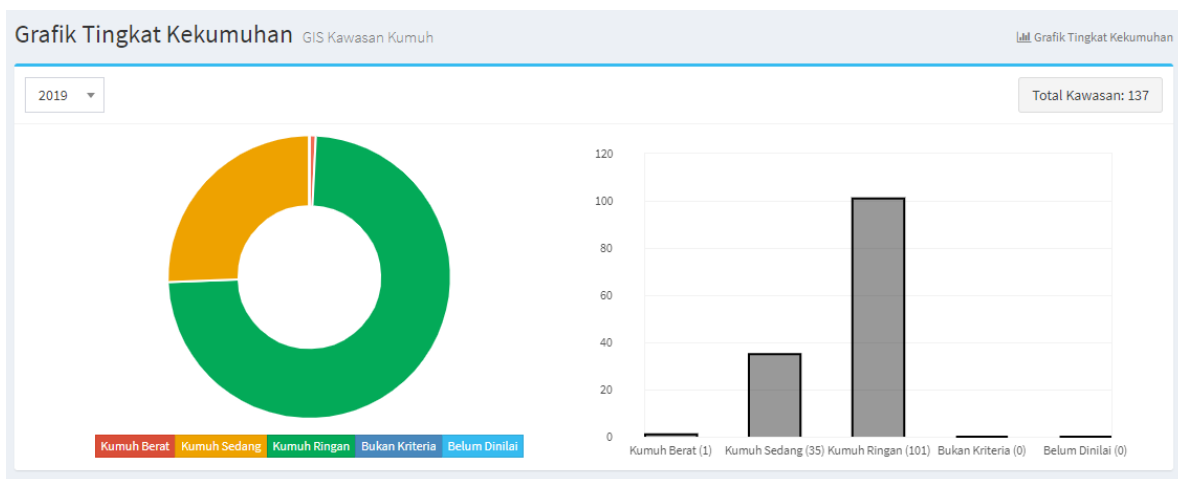


Figure 9. Slum area graph

4. Conclusion

The information system developed in this research can be used to convey information about slums in the city of South Tangerang in the form of maps. Information on the level of slums can be used to make decisions related to the priority of the handling program. So that the handling program is carried out on target according to the needs of each slum area. Based on the calculation process using the application there are 3 levels of slums. The mild slum level consists of 100 regions, the moderate slum level consists of 34 regions, and the heavy slum level consists of 2 regions.

Acknowledgement

Thanks to Universitas Komputer Indonesia that has been supported and presented in INCITEST 2020. Members of the Department of Information are helped for completing research. Especially thanks to Rector of Universitas Komputer Indonesia Prof. Dr. Ir. H. Eddy Soeryanto Soegoto, MT has remembered me about the milestone report and for all support provided.

References

- [1] Brueckner, J. K. 2013. Slums in developing countries: New evidence for Indonesia. *Journal of Housing Economics*, **22**(4), pp. 278-290.
- [2] Nurdiansyah, A. 2018. Urban Slum Upgrading Policy in Jakarta (Case Study: Kampung Deret Program Implementation). *The Indonesian Journal of Planning and Development*, **3**(1), pp. 19-31.
- [3] Sari, A. C. P., Suman, A., & Kaluge, D. 2018. Implementation Analysis of Participative Development in National Slum Upgrading Program [KOTAKU]. *IJEBD (International Journal of Entrepreneurship and Business Development)*, **2**(1), pp. 17-35.
- [4] Prianto, A. L., & Amalia, A. A. 2019. Combatting Slums, Sustaining Poverty: Dynamic Urban Governance in Makassar, Indonesia. *Otoritas: Jurnal Ilmu Pemerintahan*, **9**(1), pp. 28-41.
- [5] Pressman, R. S. 2005. *Software engineering: a practitioner's approach*. Palgrave macmillan.
- [6] Kendall, K. E., Kendall, J. E., Kendall, E. J., & Kendall, J. A. 1992. *Systems analysis and design* (Vol. 4). New Jersey: Prentice Hall.
- [7] Zalsabilla, F., & Ariastita, P. G. 2018. Faktor-Faktor yang Mempengaruhi Ukuran Urban Compactness di Kota Tangerang Selatan. *Jurnal Teknik ITS*, **7**(2), pp. C88-C94.
- [8] Nurdiansyah, A. 2018. Urban Slum Upgrading Policy in Jakarta (Case Study: Kampung Deret Program Implementation). *The Indonesian Journal of Planning and Development*, **3**(1), pp. 19-31.
- [9] Pemerintah Indonesia. 2016. Peraturan Pemerintah Republik Indonesia Nomor 14.
- [10] Teixeira, S. 2018. Qualitative geographic information systems (GIS): An untapped research approach for social work. *Qualitative Social Work*, **17**(1), pp. 9-23.
- [11] E. Walters. 2019. *Using UML Activities to model Business Processes: A Handbook for Practitioners (Handbooks for Modeling the Enterprise 1)*, New York: Independently Published.
- [12] Anurogo, W., Lubis, M. Z., Pamungkas, D. S., & Ibrahim, F. M. 2017, December. A Spatial Approach to Identify Slum Areas in East Wara Sub-Districts, South Sulawesi. In *IOP Conference Series: Earth and Environmental Science*, **98**(1), pp. 012030.
- [13] Alwini, A. F., & Herdiansyah, H. 2018. Urban Governance Management Towards Managing Slum Area in Indonesian Cities. *Matra Pembaruan: Jurnal Inovasi Kebijakan*, **2**(2), pp. 111-121.
- [14] Ichwatus Sholihah, P., & Shaojun, C. 2018. Impoverishment of induced displacement and resettlement (DIDR) slum eviction development in Jakarta Indonesia. *International Journal of Urban Sustainable Development*, **10**(3), pp. 263-278.

Reproduced with permission of copyright owner. Further reproduction prohibited without permission.