International Journal of Psychosocial Rehabilitation, Vol.24, Issue 01, 2020
ISSN: 1475-7192

The implementation of Geographical Information System for Monitoring the Population in Cimahi

[1] Dani Hamdani, [2] Kadek Indra Sentana, [3] Mellivia Sulistiono, [4] Vellya Martha Rischi, [5] Yandhi Andriana

Abstract
All development planning at the local and national levels requires basic population information such as population, age, sex, and other characteristics. This study discusses the implementation of Geographic Information Systems to monitor the population in Cimahi. QGIS was chosen because it has a programming language that can allow various types of spatial data to be open from any source. The final results of the geographic information system that has been made can display information about the distribution of the population visually. In addition, this geographic information system can also provide information about regional population density data.

Keywords: *monitoring, population, cimahi, qgis*

Introduction

According to the Head of the Population and Civil Registry Office (Disdukcapil) of Cimahi City, the population in 2018 alone has reached 607,811 people, so that when compared to the Cimahi area which is only around 40 km2, the population is considered not ideal because it should be every kilometer square of population is 1000 people, while Cimahi City has a population density of 15,071 people / Km2 [1].

Information about the current population distribution is still not optimal because the information presented is still limited in tabular form alone, causing readers to have difficulty understanding / understanding the data and also difficulty in drawing conclusions and decision making. The presentation of information in the form of visual maps can be more helpful in the process of observing population distribution. GIS (Geographic information system) is a system designed to capture, store, manipulate, analyze, organize and display all types of geographic data [2].

Research on the use of GIS for mapping population has been done by Ural, et al in 2011, it's just that because the map used is the result of satellite imagery, the presentation of data in the form of maps looks less optimal [3].

Geographic information systems require two types of data which are important components in relation to system development, namely spatial data and non-spatial data. Spatial data is the result of digitization of maps using QGis which is then converted into PostgreSQL to produce Geometry data types. PostgreSQL allows each user to create their own object files that can be applied to define data types, functions and new programming languages so that PostgreSQL is very easy to develop or implement at the user level [4].

To convert spatial data into PostgreSQL requires the PostGIS extension. PostGIS is a spatial database based on open source as an extension of PostgreSQL that is used to input spatial data into PostgreSQL [5].

---

[1] *Information System Department, Faculty of Engineering, Widyatama University. dani.hamdani@widyatama.ac.id*
[2] *Information System Department, Faculty of Engineering, Widyatama University. indra.sentana@widyatama.ac.id*
[3] *Information System Department, Faculty of Engineering, Widyatama University. mellivia.sulistiono@widyatama.ac.id*
[4] *Information System Department, Faculty of Engineering, Widyatama University. vellya.martha@widyatama.ac.id*
[5] *Information System Department, Faculty of Engineering, Widyatama University. yandhi.andriana@widyatama.ac.id*

QGIS was chosen because it has a programming language that can enable open various kinds of spatial data from any source. This, of course, can save our time in converting data types. The nature of open source QGIS also makes it a major strength of QGIS. All QGIS tools and plugins can be used free of charge. in addition, the simple and user-friendly QGIS display is also one of the advantages, especially for new users.

The purpose of this study is to implement a geographic information system that can monitor the population in Cimahi so that it is expected that policymakers can take appropriate action to deal with their development planning.

Literature Review

Geographic Information System

According to Prahasta geoghraphical information system is a system used to collect, inspect, integrate and analyze information related to the surface of the earth. GIS is a system that emphasizes the elements of geographic information. The term "geographical" is part of spatial. These two terms are often used interchangeably or exchanged until the third term, geospatial, arises. These three terms contain the same meaning in the context of GIS. The use of the word "geographical" implies a problem about the earth: two or three dimensional surfaces. The term "geographical information" implies information about places located on the surface of the earth, knowledge of the position where an object is located on the surface of the earth, and information about captions (attributes) contained on the surface of the earth whose position is given or known [6].

According to Rhind suggests that "Geographic information systems are computer systems that can store and use data that describes places on the surface of the earth." [7].

And, according to Burrough, geographical information systems are a set of tools for collecting, storing, examining, integrating, manipulating, analyzing and displaying data from the real world for a specific set of goals[7].

According to the Department of Environment, geographic information systems refer to systems that are useful for capturing,storing,examining,integrating,manipulating,analyzing and displaying data that is spatially referenced to Earth[7].

The understanding of spatial data refers to the data related to the position, objects and their relationship in the earth space. Spatial data is information that contains information about the earth, including the surface of the earth, below the surface of the earth, waters, oceans and atmosphere. Spatial data and its derivative information are used to determine the position of the identification of an element on the surface of the earth [8].

GIS and remote sensing methods are enormously promising in addressing problems in health management for infectious diseases[9].

PostgreSQL is an open source client / server relational database. PostgreSQL provides a unique combination of features that can be compared with major commercial databases (such as Sybase, Oracle, and DB2). One of the major advantages to PostgreSQL is that it is open source [10].

Population is defined as a group of individuals of the same species living and crossing in a given area. Population members usually depend on the same resources, are subject to similar environmental constraints, and depend on the availability of other members for long-term retention. Population size is defined as the number of people who appear within a subjectively specified geographic range [11]. The population behaves differently depending on its size. Less population faces greater risk of extinction [12].

A more complete description of population size includes population density-the relationship between population size and the space it occupies [11].

Not everyone contributes equally to the population. Sometimes, researchers find it useful to characterize different contributions of different individuals. First, classify individuals into categories of a certain age group, such as "teenagers" or "sub-adults" [13].

Method

The research methodology is described in order to facilitate the process of analysis and design of application design and divided into several stages.

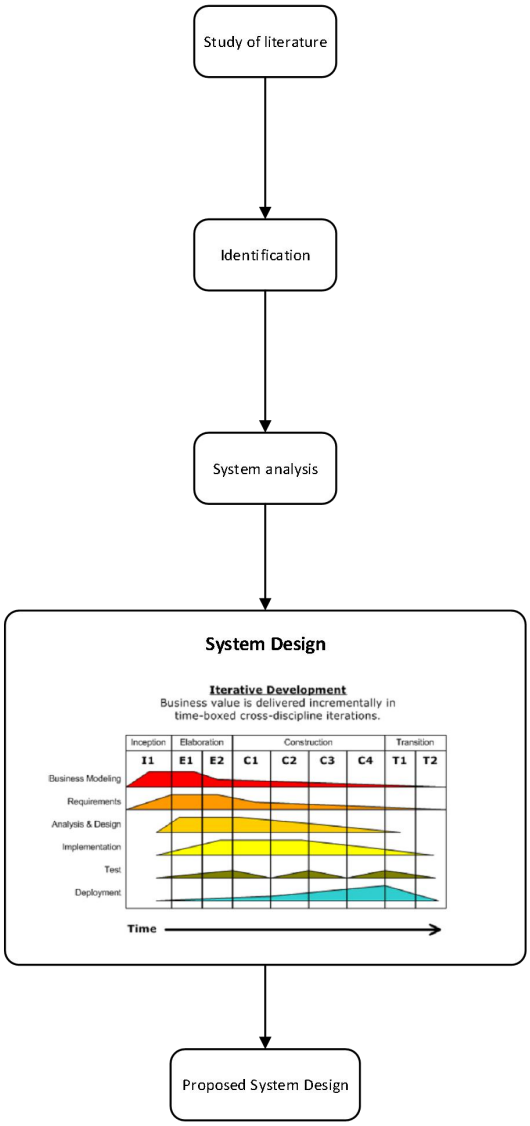

Figure 1: Research Framework

The stages and research activities carried out are as follows:

1. Study of literature
   At this stage, the literature is collected, both from previous studies and from scientific journals.
2. Identification
   Then at the problem identification stage, identification of existing problems is carried out.
3. System analysis
   Then at the analysis stage, an analysis of the current system is carried out. So that we can know well, what are the needs of the system model that must be built.
4. System Design
   At this stage, a geographic information system model is created, making Use Case Scenarios, and making interface designs from geographic information systems.
5. Proposed System Design
   The design proposal made is a proposal for the design of a geographic information system.

Findings

To fulfill the information needs of related parties, the processes that occur are described in the form of Use Case Diagrams described in Figure 2. With the Use Case Diagram, developers are expected to be easier in designing applications because they know what processes which need to be designed.

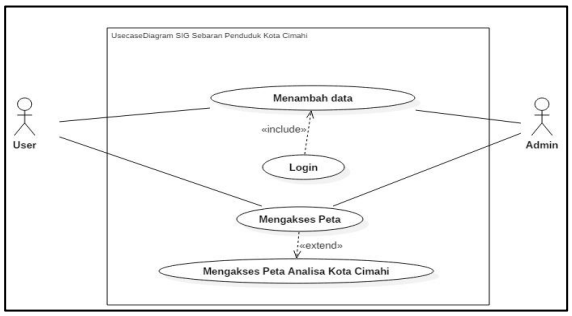

Figure 2: Use Case Diagram

The following is an example of a use-case scenario created on the geographical information system of population distribution in Cimahi.

TABLE I. USECASE SCENARIO ACCESS THE ANALYSIS MAP

Number	Skenario-4	
Name	Access the analysis map	
Actor	Admin/User	
Type	Primary	
Goal	Showing list of analysis maps	
Precondition	Admin/User has been on the main page of the website	
Postcondition	Look at the Analysis Layer	
Steps	Admin/User	System
	1. Select the Map menu	2. Displays the map page
	3. Pressing the (+) button on the map Analysis (left of the map image)	4. Showing list of analysis maps

Following are some of the views / interfaces of QGIS population data distribution in Cimahi:

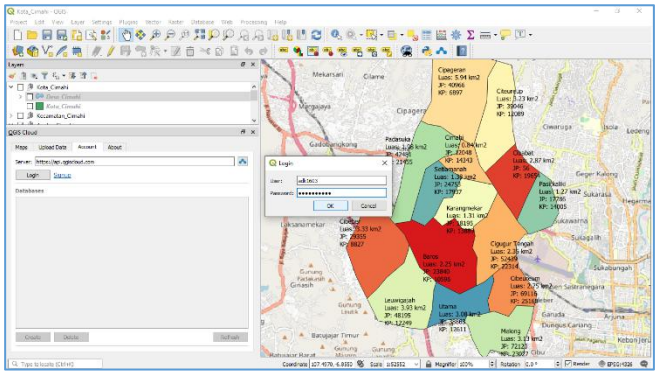

Figure 3: Login QGIS

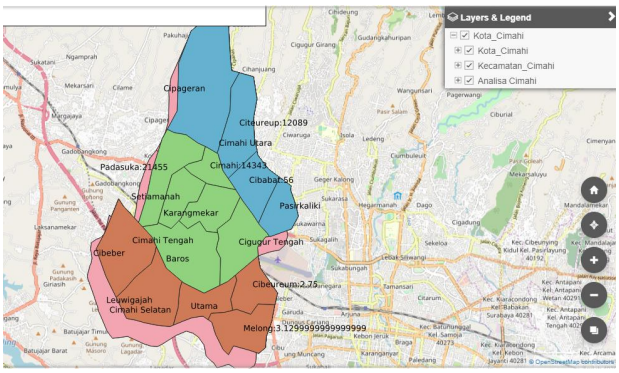

Figure 4: Cimahi Cities Basic Map

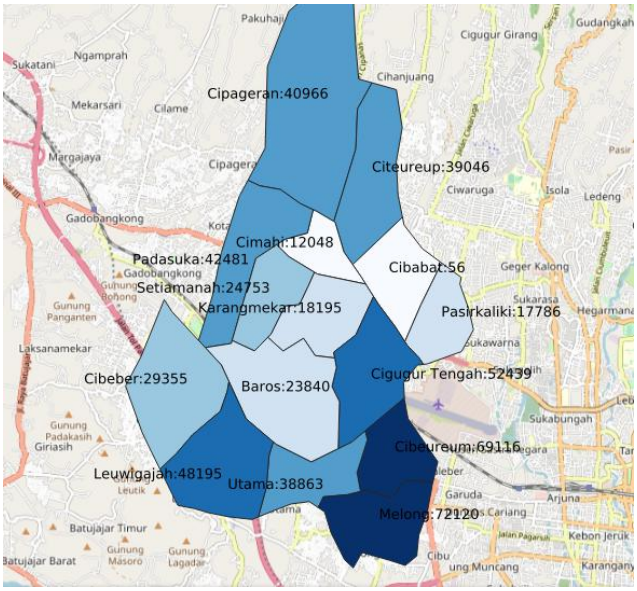

Figure 5: Map of Distribution of Population in Cimahi

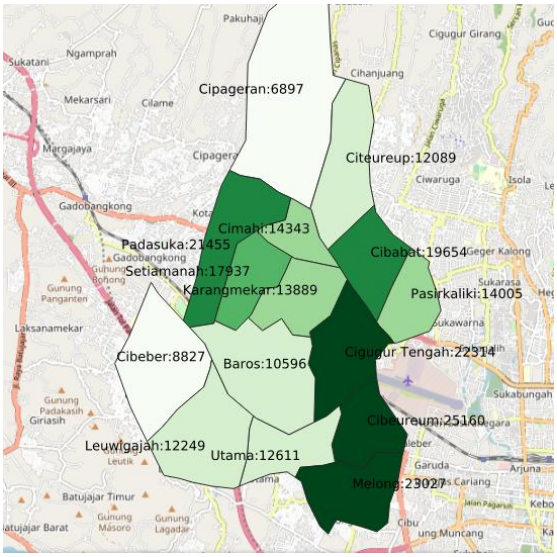

Figure 6: Map of Cimahi Population Density

Conclusion

Based on the results of the completed studies, it can be concluded that the geographic information system model can display information on the distribution of population data visually. In addition, this geographic information system model can also provide information on regional population density data so that the government can determine more appropriate policies. However, to be more optimal, it is recommended that the Geographic Information system be developed in a mobile platform.

References

[1]. http://www.cimahikota.go.id
[2]. Irwansyah, E. (2013). Sistem Informasi Geografis:Prinsip Dasar dan Pengembangan Aplikasi. Yogyakarta: DigiBook.
[3]. Ural, S., Hussain, E., & Shan, J. (2011). Building population mapping with aerial imagery and GIS data. International Journal of Applied Earth Observation and Geoinformation , 13 (6), 841–852.
[4]. Obe, R. O., & Hsu, L. S. (2011). PostGis In Action. California: O'Reilly Media.
[5]. Obe, R., & Hsu, L. S. (2012). PostgreSQL: Up and Running. California: O'Reilly Media. California: O'Reilly Media.
[6]. Prahasta, Eddy (2002). Sistem Informasi Geografis: Konsep-Konsep Dasar Informasi Geografis. Bandung: Informatika Bandung.
[7]. Gregory E. Glass., J. L. (1993). Applications of GIS Technology to Disease Control. The Johns Hopkins University School of Hygiene and Public Health Department of Population Dynamics.
[8]. Budiman, E. (2016). Analisis Spasial Data Jaringan Internet Service Provider Di Kecamatan Sungai Pinang Kota Samarinda Berbasis Mobile. Jurnal Ilmiah
[9]. Heywood, I. C. (2011). An Introduction to Geographical Information Systems. Prentice Hall.
[10]. Douglas, K. (2003). "PostgreSql," in PostgreSql A Comprehensive Guide to Building, Programming, and Administering PostgresSQL Databases. Gramedia
[11]. Lebreton, J-D. et al. (1992). Modeling survival and testing biological hypotheses using marked animals: A unified approach with case studies. Ecological Monographs 62, 67-118.
[12]. Caughley, G. (1994). Directions in conservation biology. Journal of Animal Ecology 63, 215-244.
[13]. Dodge, Y.,(2006). The Oxford Dictionary of Statistical Terms. Oxford, UK: Oxford University Press