Geografis Information System of Determining the High School (SMA) Zonation in Merauke City in Receiving New Students (PPDB) Using the Buffering Method

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Abstract. Education is one of the bases in creating an atmosphere, learning processes in increasing the knowledge of skills and character development of each person. The Education and Culture Office of the Merauke Regency based on the Permendikbud Republic of Indonesia No. 51 of 2018 and Permendikbud No. 20 of 2019 concerning zoning determination, if students want to register to be accepted at the school, they must pay attention to the distance between their place of residence and the distance of the closest school, so that there is an even distribution of the number of students, as well as the composition of knowledge from students nothing is too dominating as a whole but evenly. This research is carried out by utilizing the Geographic Information System (GIS) in determining to zone for students who will register to Senior High School (SHS) in the Merauke city area, to obtain information about the nearest school based on Government regulations, the parameter used is distance radius, the method applied in this research is the buffering analysis model. This analysis model can identify locations to obtain coverage that can be used in identifying objects based on the radius, thus producing polygons around objects. The results of this study are in the form of GIS to SHS and can map and determine SHS zonation in Merauke City, as well as displaying the distribution of SHS in Merauke city.

1. Introduction

Education is a basic need that is very important for society today. Based on article 1 of the Law on the National Education System (SISDIKNAS) in 2003 explaining Education is a conscious and planned effort in realizing the atmosphere of learning and the learning process so that students actively develop their potential to have strengths both spiritual, religious, self-introduction, personality intelligence, noble ahklak, and skills possessed in the community, nation, and state.[1]

Merauke City is an area of the Merauke Regency. In this research, the focus is on the Merauke District area, where the city of Merauke is at the core of economic, educational and at the same time the wheels of government. The total population according to Merauke in 2019 with the number of 51379 men and 49643 people. With a ratio of the population density ratio of 61.8, it means that every 1 km² of land area in the Merauke district is inhabited by 61 to 62 residents. Thus making the population with a ratio of Education based on the number of Senior High School (SHS) 17 classrooms, the number of students 6216 students and the number of teachers 516 people. This makes the distribution of school students important to note. The determination of favorite school selection becomes an obstacle in the distribution of the number of students in
each school, so that the application of school zoning becomes an excellent alternative, to support the tightening of the number of students in each school.[2]

Geographical information system (GIS) is a spatial-based information system that can display or present information very well that can be depicted in the form of images or maps, so that it is easily understood and understood by many groups, and makes it easier for users to manage and develop existing information [3]. The ability of GIS in presenting data, making a spatial-based data processing model, is becoming more interesting and becoming the current trend in data presentation and processing. The determination of school zoning by utilizing GIS as a form of output in data management becomes a very good alternative. In this study, the author combines the Buffering and GIS models in determining school zoning for new students in the selection of the closest school based on zoning. The parameter used in this study is the radius of the distance between the student's residence and the nearest school.

2. Theoretical Review

2.1 Geografis Information System.

GIS can be used as a medium of information, which is interactive, in business to increase understanding, learning and education regarding Geographically, the location, space and population are described above. In other studies related to the ability of GIS is mapping schools in Tanjung Batu based sub-district, which results in a software that is capable of being used by users in knowing and finding which school to go to, where the school is located in the Tanjung Batu sub-district [4].

The determination of zoning becomes a solution for the government in determining the policy of equal distribution of students in each school. GIS development using Buffering analysis can show the distance between student residence and the existing school. Based on research conducted, the use of GIS with Buffering Analysis makes the process of selecting the closest school very effective. Evidenced by the results of interviews with respondents using the Google form facility, that the selection of schools using this model is very effective. Because students only need to see the closest location based on a specified radius, to see the school that will be entered and can be accepted.[5]

2.2 Zonasi

School zoning is a rule that is applied by the government in the equal distribution of new students in a school. This policy is expected to have no accumulation of high achieving students in a school, or a lack of students in a school. So that the number of students is evenly distributed and reduces the distance of students to go to school. Regulations related to school zoning are regulated in Permendikbud Republic of Indonesia No. 51 of 2018 and Permendikbud No. 20 of 2019 concerns zoning determination.[1]

2.3 Model Buffering

The buffer model is a form of analysis, which is in GIS. in the analysis process the buffer will yield the range of coverage used to identify school locations based on radius from the distance between the school and the student's home.[6]

3. Methodology and Application Design

The determination of school zoning using the concept of GIS in the presentation of data is carried out with several stages. The details are shown in Figure 1.
In this study there are several stages carried out, the initial stages are carried out namely preparing the tools and materials needed in the study, namely, a set of computers or laptops, and GPS then the material is, the administrative map of the city of Merauke or Merauke district, the location map of Senior High School, and student location data and road maps. The research data is separated based on the type of spatial data and non-spatial data, then merged into a Data Management System (DBMS). The next system works is that students just need to enter their address, then the system will automatically carry out an analysis using the Buffering model in forming polygons and inform the schools that students must enter based on radius [6].

4. Result

In this section, it is explained in terms of the type of data used, and an overview of the system used. The data was obtained from the results of the location survey in taking coordinates and using Google Maps to verify the data. This study describes the determination of the school to be the closest radius of the student, not the decision making so that students can choose the school, but only in the form of a recommendation from the system to students based on government regulations, namely the

![Figure 1. Research procedure flowchart](image-url)
closest radius of the student's residence. Based on the results of the questionnaire there is information that, there are still many students who do not know about the nearest radius, from their home to school, bearing in mind that there are several schools close to where they live, so students have problems with which school they are going to. With this system students can see which school is the closest radius to their place of residence, so students have no difficulty in seeing the school, and when viewed from an economic standpoint students also save more on transportation costs.

The next section will show the form of the system used by students in finding the nearest school based on the street name where the student lives.

4.1. Data Analysis

The data used in this study are Merauke district administration data, road data in the city of Merauke, and high school data in detail can be seen in Figure 2, 3, and 4.

In this study students only need to enter the name of the street where he lives automatically the system will display the nearest radius where the student lives and the school recommended for these students in detail can be seen in Figure 5.

![Figure 2. Desain table Administration](image-url)
Figure 3. Street Merauke City

Figure 4. Table Location Senior High School
5. Discussion and Conclusion

The results of the research conducted has a very good impact on students in knowing the location of the school that has the closest radius distance from the place where the student lives. This research is only limited to the area of the city of Merauke and the system used only displays high school (SHS) information so that it is expected that in the future it can be developed by adding other types of schools both elementary and junior high schools.

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