EUROPEAN JOURNAL OF LIFE SAFETY AND STABILITY (EJLSS)
ISSN2660-9630
www.ejlss.indexedresearch.org Volume 22, October-2022 ||

WEB-GIS Based School Zone Determination in Sungai Penuh City

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Abstract: *When selecting the Acceptance of New Students (PPDB) for the zoning route, students have difficulty determining the school zone according to their place of residence. So far, the determination of school zones only uses google maps, but the application is not explicitly designed for it. Through WEB-GIS, problems related to school zoning can be solved because this application provides spatial information specifically in determining distances that can be used as WEB-GIS. The steps taken are to select the research location, conduct a system engineering analysis of the system, and design, and implementation of the trial use and operation of the system. In systems engineering, interviews, observations, and questionnaire surveys were conducted. This system engineering is intended to find out the proposal from system analysis as the basic design material after that it enters the application development. The final stage in developing the system is testing its use by the school and students and operating the system. The results obtained for system analysis must provide school zoning information facilities that can edit data, upload data, and delete data. The test results show that the system can be run more than 75% of the respondents said they were satisfied and very satisfied. Based on the description, the development of the school zoning WEB-GIS system has been implemented well.*

Keywords: *School Zoning, PPDB, Development Model, WEB-GIS.*

Date of Submission: 25-9-2022 ***Date of Acceptance: 26-10-2022***

INTRODUCTION

The initial stage to start the education level is done by selecting new student admissions, one of the selected paths is school zoning. which divides the number of public schools by measuring the level of capacity and the number of graduates from the previous school level. The distribution of education influences the zoning system where the number of public schools between one region and another is not evenly distributed so it will influence the results of school zoning (Wahyuni, 2018).

Other problems also have a psychosocial impact on students due to the zoning system that is not proportional to the school's capacity (Andina, 2017). Based on the survey that has been carried out that the psycho-social condition of the SMA Sungai Penuh students who have registered for PPDB about 79.9% of the 389 students still expect to receive their favorite school. This indicates an understanding of the zoning system as a system for eliminating favorite schools in Indonesia. Sungai Penuh City is rated low. Other conditions are also seen in the unequal quality of education at the national level, this has an impact on the regional level. In Jambi province, the Ministry of Education and Culture recorded a total of 162 SMA and 104 Vocational Schools (VHS) (Education

Reference Data, 2021). Of that amount, only 36.86% at the education level have the National Education Standards (Azwan, 2017).

Sungai Penuh is one of the regions in Indonesia that has 5 units of SMA with a total capacity of 1200 students. The zoning system faces problems because the number of PPDB quotas that have been determined in each school is not proportional to a large number of applicants. The problem occurs because of the unequal distribution of SMA in each sub-district, where the Kumun Debai, Sungai Bungkal, Pesisir Bukit, and Tanah Kampung still do not have SMA. The problem becomes even more difficult when students begin to feel that they are not getting the same education rights. This happens only because their homes are far from public schools or there are no public schools in their area. So that students get convenience and justice to be able to go to school and receive education at their favorite schools (Lestari & Rosdiana, 2018).

The enactment of the zoning system is also inseparable from problems between one region and another, namely the occurrence of differences in alternative schools that cause injustice. One of them is SMA 2 Sungai Penuh where many students do not graduate in the school zone (Syahdanur, 2019). This can also be seen at SMA 3 Sungai Penuh where there is 54% of the capacity has not been filled at school so there is no equal distribution of education in Sungai Penuh City. One way to minimize the potential for conflicts that occur due to the zoning system is not in line with the objectives of PPDB is to provide information about the distribution of SMA and school zones.

Service Area is a coverage analysis that is separated from each other and is limited by a network-based radius. It aims to provide information on the range of facilities in the form of polygons which will later connect the points on the network based on the desired distance from the origin (Upchurch *et al*., 2004). The use of service areas for school zoning influences the availability of transportation facilities which can be another factor for parents to send their children to school. Research conducted by Wang *et al* (2019) found that the decision to reach school by foot is influenced by environmental variables where a student decides to walk to school between 1000 m to 1600 m. The solution to this problem is to use a road network analysis of school coverage because the service area provides service zones based on existing and accessible road access (Andari *et al*., 2020).

Utilization of service areas in determining service coverage will provide information on the extent of school coverage that is included in the zoning or not as well as providing coverage information using maps. Maps are objective information showing the location of geographic objects in print. Map information can be seen in the form of images but the lack of map publications is still limited to the community, this is one of the reasons for using WEB-GIS. WEB-GIS is a network-based Geographic Information System that provides the publication of spatial data that can be used in various fields so that information can be accessed by the public by being distributed in a computer network (Stefanakis, 2008). WEB-GIS is also an alternative in data storage which functions to collect, store and display information data that indicates the location of a particular object using the internet network (Painho, 2001).

The use of WEB-GIS in the school zoning system makes it easier for students to find schools that match their zoning, this can be seen based on the research of Ariyanto *et al* (2019); Hermon where the application to determine zoning according to the high school level in Bogor City can determine PPDB based on the scores obtained. Obtained, in the form of a zoning distance score from the PPDB's home address to the desired school. This is a good tool for determining school zoning. In Sungai Penuh City, students have tried to measure the distance of school zoning whereas from the survey results 60.4% of 389 students have done it on Google Maps.

The obstacle found was the unavailability of a special WEB in terms of zoning measurements because Google Maps was not designed for this activity, thus making it difficult to determine the distance between home and school.

METHODOLOGY

The development model used is the Waterfall model. The reason for choosing this model is that it provides convenience in developing the WEB-GIS system to be used as an online map platform for data visualization (Ginardi *et al*., 2017). According to Prahasta (2009) the stages of development have 6 processes, namely:

- The system engineering stage is in the form of collecting user requirements, in the form of questionnaire data, interviews, and observations that contain several questions related to system requirements.
- The system analysis stage is a continuation of the systems engineering stage, where analysis is carried out in the form of web requirements which include the weaknesses of the current system, and then developed in the form of a proposed system.
- The system design stage, namely the design, requirements, or software specifications resulting from the analysis stage will be transformed into a software architecture that has characteristics that are easy to understand and not difficult to implement.
- The implementation stage is the making of the system from the results of the system design into the lines of program code. Components include hardware in the form of program management software and software in the form of WEB-GIS components.
- The system evaluation stage is a system testing activity that is first carried out in scenarios and then tested, the results of which are the average assessment contained in the module (class).
- The operation and maintenance stage of the system is marked by the delivery of the software to the customer which is then operated, if the software experiences a failure in carrying out its functions, it is at this stage that the developer provides improvements until the application in question can run again.

Data collection techniques in the form of observations used in the form of observations of the use of the Website and the dissemination of school information and interviews were used to obtain information on zoning needs through the vice principal of the curriculum. and questionnaires are used to analyze the system evaluation in the form of several questions related to system functions and related to systems engineering.

RESULTS

3.1 System Engineering

The need for spatial information in determining school zoning is important. Service area as a new theory in determining school zoning has several needs and compatibility with school zoning system regulations, Based on government regulations using Service analysis will divide the area according to the distribution of existing schools and identify differences between zoning based on regulations, and spatially will find out affordability schools to existing settlements, either by walking or driving (Andari *et al*., 2020). Differences of opinion are found in whether the service area is used or not. The use of WEB-GIS in determining school zoning is felt to be very necessary because considering the needs of students when registering for PPDB, the zoning route must know which schools are netted based on the zone where students live.

The provision of a website is intended for students and prospective students to obtain information on school activities, extracurricular activities, and PPDB. PPDB information is an important thing that must be notified by online schools by delivery through social media such as Facebook, Instagram, Twitter, and Telegram. Dissemination of information that is still separate through social media is an obstacle for students when looking for PPDB information, one solution to this problem

is the creation of WEB-GIS. The development of WEB-GIS has been integrated with a database system providing a data management system so that it can be accessed online, a combination of WEB-GIS as a database storage can be developed (Widyantoro *et al*., 2020).

3.2 System Analysis

The overview of systems engineering shows the need for WEB-GIS in determining school zoning is highly valued. Not only that, the need for centralized PPDB information is important where system development can provide PPDB information collection for each SMA. The use of WEB-GIS provides a solution to the problem of merging data in the form of user information to locate nearby schools with GPS and share information about school profiles to make it easier to find information about school locations and profiles (Renaldi & Anggoro, 2020). The development carried out is to create a system that can check to zone automatically and based on service areas as network access information. The results of other studies also show that WEB-GIS with Pg Routing is a geospatial database development from PostgreSQL/PostGIS applications to provide or add a route function (calculation of the shortest distance from multiline string data by calculating the weight value based on the PostgreSQL/PostGIS procedural language so that road network-based WEB-GIS development can be done (Aminullah *et al*., 2018).

3.3 System Design

Based on the results of the system analysis, four functions are the main design of WEB-GIS. Coordinate input is a function needed in collecting data on the distribution of students graduating from zoning which will be displayed on an online map. This function is needed based on the results of systems engineering in interviews with representatives of the curriculum of SMA 1 Sungai Penuh as data in evaluating the results of zoning and whether it has gone well or not. News and Gallery is a special function in collecting information on PPDB SMA throughout Sungai Penuh City which is still scattered in each high school based on the results of observations. The goal is for students to easily access PPDB information for each SMA on one website. Student needs related to requests like this are also considered high where 60% of the 389 students have the desire to access PPDB information. So with this function, it can make it easier for students to find information. School zoning checks are a function of looking at school zoning, based on the results of interviews that the need for zoning checks is needed because the PPDB system as a place of registration does not provide access to zoning checks so it will provide opportunities for students to pass the zoning system. Based on the results of the questionnaire, students also got a good response to the zoning check starting from the student's desire to check the zoning where 140 students had checked the zoning via Google Maps.

3.4 Implementation

WEB-GIS as a web application for this research is built from leaflet software. The first process to do is to install Xampp. After the installation is complete, it is necessary to adjust the appearance of the front page of the Geoportal so that the results are as shown below. During observations in several high schools, the use of spatial data as a school zoning check system has been carried out where from 389 respondents as many as 60% of students have checked the zoning distance using google maps. The use of google maps is not specially prepared to deal with PPDB activities, especially the zoning route. According to an interview with the deputy principal of SMA 2 Sungai Penuh, one of the efforts to make the PPDB implementation of the zoning route run well is to provide a special system for determining school zoning. Broadly speaking, the working principle of WEB-GIS with the zoning system has the same thing, the difference is that the determination is based on roads and service areas.

3.5 Evaluation

The system evaluation was carried out on one of the schools, namely SMA 2 Sungai Penuh as the PPDB implementer by running a predetermined scenario. Overall, the participants who had never used WEB-GIS as a school zoning information medium were satisfied with the system that had been developed. From the system model, the prepared functions also run according to the scenario according to the participants (subsection VI.E.3). If you look at the rating scale (Likert) the functionality factor is on a scale of 4.1 (1 to 5) and the satisfaction factor for the WEB-GIS system is on a scale of 4.09 (1 to 5).

3.6 Operation and Repair

Based on the results of system evaluation related to three themes of familiarity, functionality, and satisfaction the system deficiencies found were on the theme of familiarity with an average score of 2.11 while functionality and satisfaction had reached the target. Based on the evaluation of the theme of familiarity in the repair system, what needs to be done is the provision of tutorials on how to open WEB-GIS links on Google Chrome and activate GPS. This will be done during Web publications on social media were not only providing links but video tutorials on how to open WEB-GIS will be made in addition to special videos for use on the Web so that the system can run properly. The web hosting process where WEB-GIS was previously only accessible on localhost can now be accessed by internet users via a link. Hosting results can be accessed via the following link https://gis-zonasi.000webhostapp.com/. The publication of links is done on social media in the form of Instagram, Facebook, and YouTube. Social media is considered effective as a publication media because almost everyone, especially students, accesses social media so the possibility of the web being spread is greater.

CONCLUSION

The habits students, in general, are familiar with the internet world, which is marked by student activities on social media. Not only social media, but student participation in zoning issues are also quite high where there are students' efforts to find out the school zone area using google maps. Utilization of WEB-GIS is a solution to the problem of zoning check media, Students as contributors aim to carry out several activities on the Web where all information that has been inputted by the school will be accepted by students as. Not only that, there is a zoning check function to find out how the school zoning is in the student's residence and there is a data contribution in the form of location sharing which aims to see the distribution of students who have passed zoning with a display in the form of spatial data. The results of the system development utilizing WEB-GIS as a media for school zoning information are satisfied with the system that has been developed.

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