POLIBATAM PANTAU COVID-19: Geospatial WebGIS Application for Covid-19 Sharing Information in Riau Island Province

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Abstract: Accessible geo-information data availability around Covid-19 theme has become a priority since SARS-CoV-2 pandemic outbreak phase affecting more than 8 million people around the world. In this paper, we present a platform with multiple types and sources of data to escalate public awareness through information about overview, prevention, and symptoms of SARS-CoV-2 virus infection, case update, self-evaluating risk, and awareness. Through interactive, server-side WebGIS functionalities, the developer can provide multiple information sources with a high definition of accuracy with potential feedback from the user to gather more information.

1 INTRODUCTION

The capability to integrate geospatial data with non-spatial data support is promoting the geographic information system (GIS) rapid development. Internet-based GIS (WebGIS) technology (Yin et al., 2019) establish to support web application structure with GIS. Concomitant with web technology development (WebGIS) technology growth in research major and various application is evolving. Along with the widening spread of interest, application in infectious disease through the Covid-19 pandemic era became a concerning research topic.

Since last December 2019 (Chen, et al., 2020), SARS-CoV-2 virus infection around the world caused more than eight hundred thousands of deaths, and twenty million cases confirmed to be positive. With invasive disease spreads primarily from person to person through small droplets from a person with Covid-19 to others (Lai, Shing, Ko, &Hsueh, 2020), public awareness and concerns play a massive role in infection prevention (Pourghasemi, 2020). We developed WebGIS Covid-19 information for a specific area in Riau Islands Province, namely Polibatam Pantau Covid-19.

Different from other already published Covid-19 related WebGIS that cover displaying Covid-19 case around the globe in a science perspective (John Hopkins University, 2020), Covid-19 recorded case in Indonesia in government perspective (Indonesian Task Force for Covid-10, 2020), and focused Riau Island Province confirmed Covid-19 data and information with classic GIS display (Riau Island Province Task Force for Covid-19, 2020). This canal provides multiple types and source data information that can be easily accessed and perceptibly for the public with an informative and interactive manner to achieve goals as public knowledge enhancer around Corona Virus Disease 2019.

With an open-source CSS layout template, Polibatam Pantau Covid-19 WebGIS segmented into four tabs, such as Home, About Covid-19, Covid-19 on Maps using ArcGIS Online, and video discussing the health sector, especially Covid-19 Global Pandemic. Each tab consists of different levels in representation and data from various trusted sources. This paper will discuss how to develop a one-stop update for public information awareness around Covid-19 Pandemic, specifically in Riau Island Province.

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2 CONSTRUCTION AND FRAMEWORK DESIGN

The system design to provide a single stop with all in information around Covid-19 and specific daily case update in Riau Islands Province to inform the user and achieve better health knowledge and awareness. The construction requires a set of data information input, intranet simulation, and extranet publicity, as well as the easiness of user access. Integration of multi-type multi-source data for multi-user is expecting to intensify a whole set of publication that provided by many stakeholders around Covid-19 Pandemic and suppress human-to-human transmission rate.

This framework consists of four independent layers. The changes in one layer do not affect the others, which offer stability and ease of maintenance. With the 'thick-server' service, the server can effectively maintain the quality and consistency of content, meanwhile collecting data through limited interaction from the user. As shown in Figure 1, this entire system architecture is designed with three major frameworks: data layer, middle service layer, and presentation.

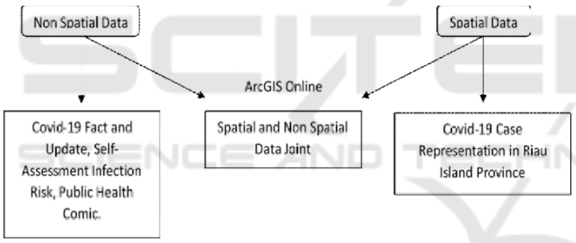

Figure 1: Polibatam pantau Covid-19 architecture.

Gathering raw data play a crucial role in Polibatam Pantau Covid-19 construction and development in part of process management planning. Two major types of data accommodate in our system: non-spatial Covid-19 data and spatial data. All gathered data were collected from various trusted sources and adjusted to adapt to our system.

2.1 Non-spatial Covid-19 Data

Non-spatial data type support in this site covers text, image, graph, and video from global and regional trusted source updates. This source covers from formal institutional data and information released by WHO (World Health Organization) (2020), Indonesian Ministry of Health (2020), Indonesian Task Force for Covid-19 (2020), Local Government for Covid-19 (Riau Island Province Task Force for Covid-19, 2020), and casual information such as validated comic, image, video, graph and article from HaloDoc website (Halodoc, 2020). Collected data items include PDP (individual in monitoring) case, ODP (patient in monitoring) case, OTG (person with no symptoms) case, positive case, recovered case, and Covid-19 confirmed death.

A series of questions adapted from the SehatQ website (SehatQ, 2020) on collaboration with the Indonesian Ministry of Health to provide self-assessing risk towards SARS-CoV-2 virus infection for the public. Quality control to maintain an excellent WebGIS public perspective mirrored with a quick question, as shown in Figure 2. Both feedback collected as a database and used to treasure user information for better development.

Figure 2: Feedback quality.

All this information segmented into three segments with different extensions based on visualization needs, such as .html and .php. Record and information updated regularly based on source updated data. Where clients only have access to view and take a self-assessing risk towards SARS-CoV-2 question. In this way, the server can well maintain system performance stability and data input-output quality.

2.2 Spatial Covid-19 Data

Spatial data involved in this WebGIS includes map layers administration from Riau Island Province. Spatial data file format in .SHP combined with attribute numerical Covid-19 case from PDP, ODP, OTG, positive, recovered, and death by Covid-19 case. This data manipulation steps were completed in QGIS and imported as a separate layer based on city/district level administration to ArcGIS Online.

3 FUNCTIONALITIES AND DEVELOPMENT

Simplification of the building process of Polibatam Pantau Covid-19, shown in Figure 3. While designing and scripting done in the intranet server with the help of CSS (Cascading Style Sheets) with health theme

and adjusted. XAMPP for Apache is used to build and registration of the pre-release website. Data migration and upload using the Batam State Polytechnic domain to achieve published https://pantaucovid19kepri.polibatam.ac.id/index.html site.

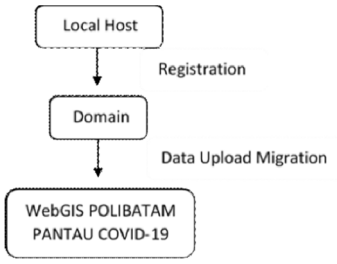

Figure 3: Development step.

3.1 Home

From this section, the user will find basic information about Covid-19 including article, info-graphic (Figure 4), Link to the outside website (Indonesian Task Force for Covid-19, 2020; Riau Island Province Task Force for Covid-19, 2020; Covidsualizer, 2020; Polibatam Self Risk Assessment, 2020) (Figure 5), daily Riau Island Province's Covid-19 update with numerical and accumulative graphical display. Comic (Figure 6) about Indonesia's government recommendation to stay at home during Covid- 19 outbreak provided for the user to be downloaded as a vehicle to reach a various level of user.

3.2 About Covid-19

Further Covid-19 related articles from various source and contributor presented on this section to inform user basic knowledge what is Covid-19 and how dangerous it is. Quality control feedback from user (Figure 2) embedded in this section. At this tab also published information about Batam State Polytechnic personal safety equipment donation for health sector workers who in need of supply along with fast response call center for Riau Island's Covid-19, as displayed on Figure 7.

Figure 4: Info-graphic created to inform the user how to minimize the spread.

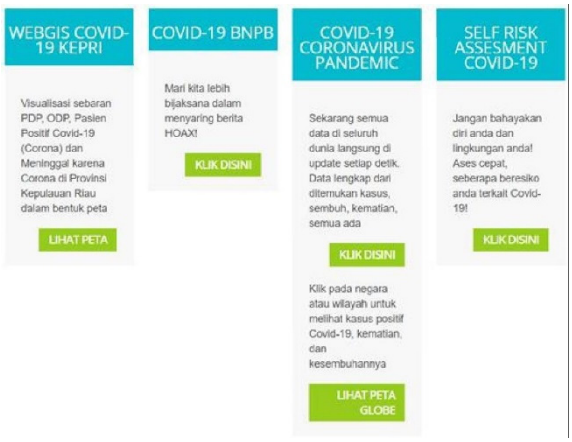

Figure 5: Supportive website link attachment.

Figure 6: Downloadable comic provided with Covid-19 prevention theme.

Figure 7: Fast Response Call Center Attached.

3.3 Covid-19 on Maps

Polibatam Pantau Covid-19 WebGIS provides various information attributes such as PDP, ODP, OTG, positive, recovered, and Covid-19 confirmed death in Riau Island Province's (Figure 8) updated daily based on the formal local government press release. The base map for this representation can be pick using satellite imagery, imagery hybrid, streets, topographic, navigation, terrain with labels, map canvas, national geographic style map, oceans, and OpenStreetMap (OSM) based on a build-in option provided by ArcGIS Online.

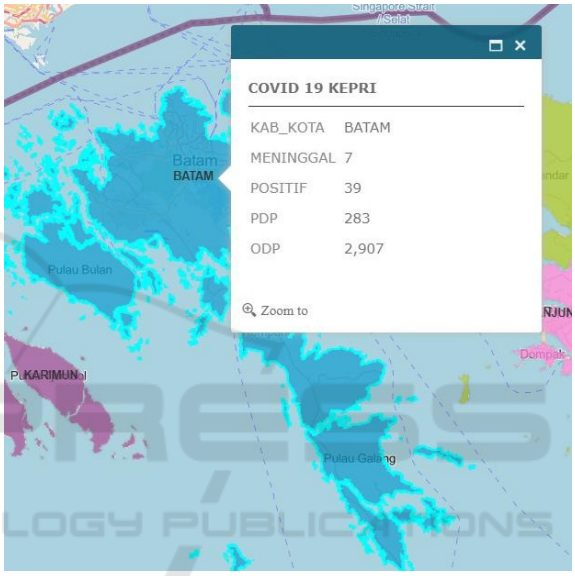

Figure 8: Map attribute label.

Each city and regencies in Riau Island Province, such as Batam City, TanjungPinang City, Bintan Regency, Natuna regency, Anambas Islands Regencies, Lingga Regencies, and Karimun Regencies separated in the different map layer. For each region, the color label using non-gradual type and not indicating the rate of severity degrees (Figure 9).

Each category value is recorded, linked, and accumulated to build statistical trend lines to provide an instant perception of how Covid-19 outbreak developed every day in this province (Figure 10). Since the statistical analysis of pandemic recorded data proven to hold crucial functionality (Qian, Zhang J. Yang, & C. Yang, 2004), this representation provided to build a quick overview of how the situation changes over time. Consist of information from the entire positive case, active positive case, until healed positive case to specified user perception.

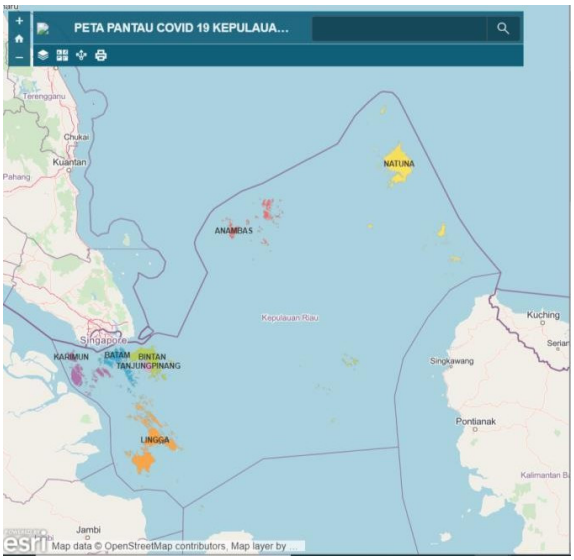

Figure 9: Thematic mapping for Covid-19 in Riau Island Province.

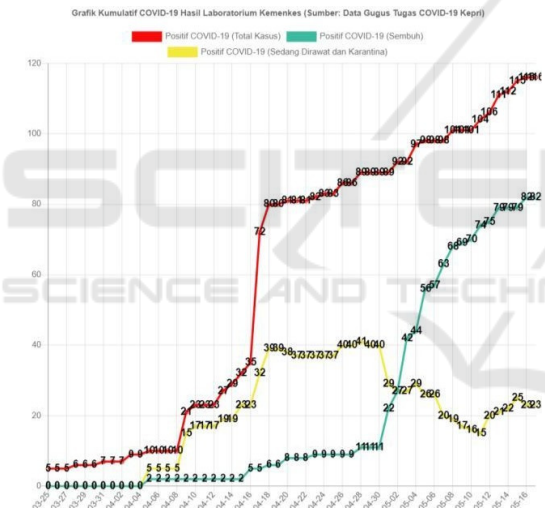

Figure 10: Trend line statistical analysis.

3.4 Video

Embracing the diverse user backgrounds, especially in Riau Islands Province, our project provides visual video information to promote a higher rate of information delivery from the creator to a client. Video embedded is from various sources, such as secondary data like news, trusted popular health influencer, 3rd party video publisher, and primarily data produced by our team (Figure 11).

Figure 11: Video produced by our team.

4 CONCLUSIONS

The rise of information technology development triggers the rapid growth of WebGIS applications in the heath sector. Information publicity with internet bases in the pandemic era proves their strength to deliver data and information for the public since the ease of access with no specific tools and requirements. Polibatam Pantau Covid-19 is a typical application case. Thick-server attitude adapted to maintain accuracy and stability of information delivered to the clients, mainly in WebGIS that gather information from multiple sources and display various types of data. Polibatam Pantau Covid-19 recorded positive feedback from the user and proven to handle a high visit rate.

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