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Geographic Information Systems of Small Industry Development During Pandemic

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ABSTRACT

During the pandemic it caused disruption in all fields, including Small Industries. One of them is small Industries in the city of Jayapura experienced taking down of sales during the pandemi. Industry fields gave helping for small industry in Jayapura as improvement and stability to improve Small Industries during this pandemic. The Department of Industry, Trade, Cooperatives and SMEs only has information data from Small Industry Assistance and there is no development data, especially during the pandemic, development level data is needed to view and store data from observations. Therefore it is necessary to have a geographic information system to collect and provide information to small industries regarding the level of development, using the PIECES analysis method, designing using the Unified Modeling Language (UML) method, using the waterfall development method and the software used is QGIS. This research produced a Geographic Information System for the Development of Small Industries in the Pandemic as information for small industries in North Jayapura.

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1. Introduction

Small Industry is one of the important sectors in Indonesian economy, because it is able to provide employment, small industry also becomes primary and secondary source of income for many households in Indonesia. In addition, Small Industries also have an important role in regional economy and encourage export growth in non-oil and gas sector and become a supporting industry to produces handicrafts and culinary.

In the era of decentralization, local governments are trying to develop Small Industries to encourage regional economic growth. We realize that the development of Small Industries in the regions is closely related to regional autonomy. Regional autonomy in Indonesia, which has been implemented since 2001, has given regions the opportunity to regulate their own regions. Local governments manage resources based on their local potentials, including regulating Small Industry players in their own regions. The basis for the activities of Small Industries is the small people. Therefore, Small Industry is one of the important foundations in the national economy.

During the pandemic, it caused taking down in all fields, including Small Industries which experienced taking down from sale of various products and production activities. Industry fields gave

helping for small industry in Jayapura as improvement and stability to improve Small Industries during this pandemic. This help was given for small industry was held taking down or upgrading and stabilizing during this pandemic. (Source: Department of Industry, Trade, Cooperatives and SMEs of Jayapura).

Based on the results of observations at Department of Industry, Trade Cooperatives and SMEs, Jayapura, the problems include the lack of development data during pandemic related to Small Industry Sector such as Handicrafts and Culinary. The Department of Industry, Trade, Cooperatives and SMEs, jayapura only has information data from Small Industry Assistance and there is no development data, especially during pandemic, development level data is needed to view and store data from observations in dealing with small industries was held in taking down, upgrading, and stabilizing during pandemic to help the problems experienced.

The purpose of this research to help the problems experienced by the Department of Industry, Trade, Cooperatives and SMEs of Jayapura, the Industrial Sector in knowing the level of development of Small Industries during pandemic to help produce the products. Geographic information system is a form of information system to presents information in graphical form using a map as an interface. The data provided is spatial data, it is visualized using thematic maps and non-spatial data, it is directly related to locate data. This system is expected to help the government of Department of Industry, Trade, Cooperatives and SMEs Jayapura to find out the level of development of Small Industry at Papua in the North Jayapura during pandemic.

In this research, the method was used is data collection by interview and observation. The data analysis used analysis of Performance, Information, Economic, Control, Efficiency, and Service (PIECES). PIECES analysis was chosen because it identifies problems by taking important aspects in an organization, namely: performance, information, economy, control, efficiency, and service. The reason for using PIECES method is because this method can describe the role of system in helping to solve previously problems. The system development method was used waterfall method. Waterfall method is considered appropriate to be used in new system projects, both on a small, medium and large scale. In Waterfall method, the new work system can be monitored easily, scheduled and has a clear development phase structure to result optimal system.

2. Methodology

GIS is a system designed to capture, store, manipulate, analyze, and manage..all types of geographic data. Its ability is a great application [1]. The process data of GIS is geo-spatial data, namely spatial data and non-spatial data. Data spatial is geographical data, suvh as geographical conditions are rivers, administrative areas, buildings, and roads. Non-spatial data is the text or number data in, it called to as attributes, is a form of non-spatial data [2][3].

Using QGIS as a map generator, Quantum GIS (QGIS) is an open source and cross-platform Geographic Information System (GIS) application. It can run on operating systems including Linux. QGIS provides the functionality and features that Geographic Information System users need. By using plugins and core features, it is possible to visualize (demonstrate) the mappings (maps) for later editing and printing into a complete map. Users can combine process data, analyze data and edit data based on the needed.[4]

2.1 Research Methodology

2.1.1 Data Collection

The method used as data collection in this research are as follows:

1. Interview
   Interview is a process of data collection through a question and answer process by meeting face to face with the relevant informants.
2. Observation
   Observation is the process of data collection by observing and reviewing directly in the field. In this case, the researchers conducted direct observations and reviews on small industries in Jayapura. Researchers made direct observations to small industrial locations related to taking the coordinates of Latitude-Longitude by using mobile phones and Google Maps application.
3. Literature Study
   Literature study is data collection as way of collect information from few of relevant research. It was used as reference and comparison for this research. This research also used several journals as references from different sources and years of manufacture, with a minimum limit of 5 years prior to the present.

2.1.2 Data Analysis

Data analysis was used is Performance, Information, Economic, Control, Efficiency, Service (PIECES). This method was chosen because it can identify problems in a system based on six components, it makes the problems can be understood properly. In the PIECES analysis, the components was used to analyze information systems performance, information, economics, control and security, efficiency and service[5].

2.1.3 Design Method

Design method was used in this research is Unified Modeling Language (UML)[6][7]. UML is considered appropriate because using this method can make problem solving in making website-based designs. UML method used The design method used is Unified Modeling Language (UML). The UML models used in this research are Use Case Diagrams, Class Diagrams, Sequence Diagrams, and Activity Diagrams. UML is considered appropriate because it uses object-based design and it can describe the system flow clearly, specifically and easily understood[8].

2.1.4 Development Method

Development method was used in this research is waterfall method. The use of the Waterfall method is considered appropriate because using this method can conduct gradually and systematically. It was conducted by completing the first step, if it was not complete, the next step cannot be continued, it can reduce errors might be occur indirectly [9].

2.1.5 Testing Method

In this research, black box testing will be used for the final test. It focuses on functionality and output system. Black box testing pays attention to system details, system function, and system flow of being created. This method conducted to find out whether the functions of the application buttons are function or not and whether the input and output data has appropriate or not. If they have been appropriate, it means the system is passed [10].

2.2 System Design

In this research, system design includes process design, database design, interface design and structure design.

2.2.1 Process Design

This process using Software Requirement Specification (SRS), System Scenarios, Use Case Diagrams, Class Diagrams, Sequence Diagrams and Activity Diagrams.

1) Use Case Diagram

Use case is a modeling to describe the whole system. Use case diagrams describe the interactions between one or more actors. It is used to find out what functions are in a system and who can use its functions [11]. In the use case diagram design that will be made two actors, namely: admin and visitor. The interaction of these actors can be seen in Figure 1 below.

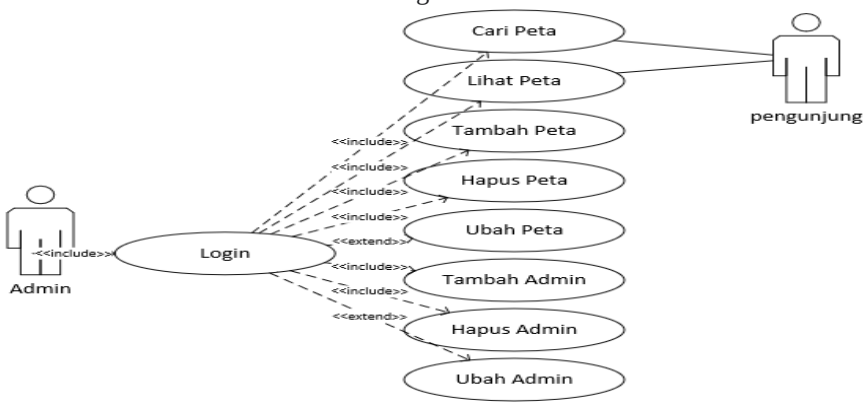

Figure 1 Use Case Diagram Actor as Admin

Figure 1 describes use case diagram where visitor actors can perform activities, view maps and search maps. Admin actors can perform activities to view Maps and search for Maps without having to login first. The admin actor must first login to enter the admin page. In admin page, admin can add map, change map, remove map, add admin, change admin, view admin and remove admin.

2) Class Diagram

The proposed class diagram can be seen in Figure 2 as follows:

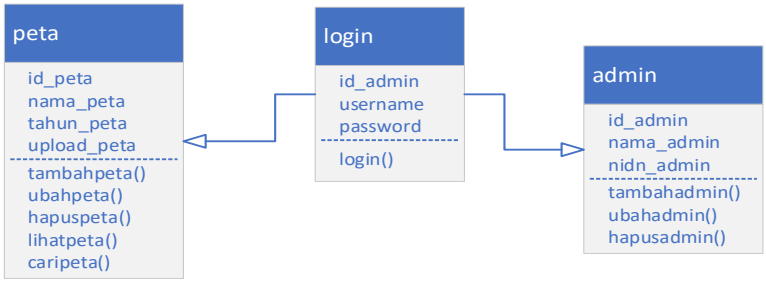

Figure 2 Class Diagram

Class login has a generalization relationship with admin class and map class in terms of the relationship between more specific class, namely: admin class and map class. Class login has username and password attributes with visibility protected. Admin class has attributes, namely admin_name, nidn_admin level with visibility public. While id_admin is different based on its class with visibility private. Map class has attributes, namely map_name, map_year and map_upload_level with visibility public. While id_peta is different based on its class with visibility private.

Admin class and Map class have directed association relationship with a multiplicity of one and one or more, it means that one admin has one or many Maps. Map class has map_id attribute with visibility private and map_name and map_year with visibility public.

3) Sequence Diagram

Proposed sequence diagram is as follows:

1. Sequence Diagram Login

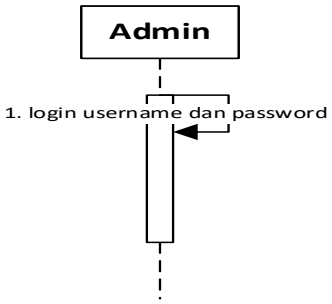

Figure 3 Sequence Diagram Login

Based on Figure 3 describes login sequence diagram which consists of one object, namely admin. Admin object has login method with username and password attributes. Login method will be running when admin logs in.

2. Sequence Diagram Admin

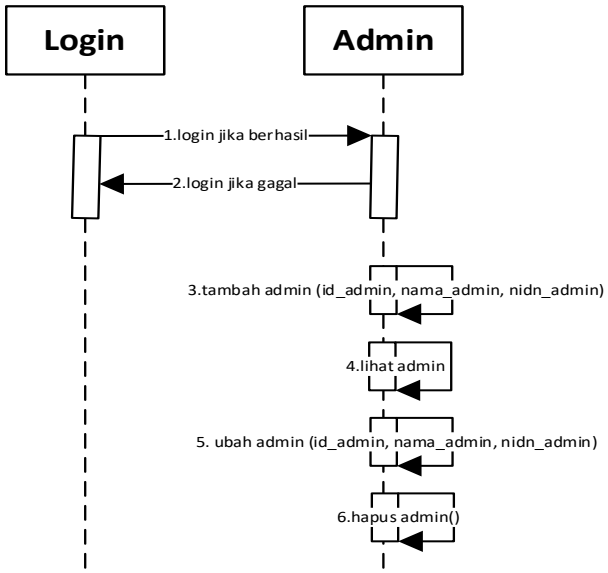

Figure 4 Sequence Diagram Admin

Based on Figure 4 describes sequence diagram admin consists of two objects, namely login and admin. Admin object requires login first from login object to add admin, view admin, change admin and remove admin with attributes id_admin, admin_name and nidn_admin.

3. Sequence Diagram Map

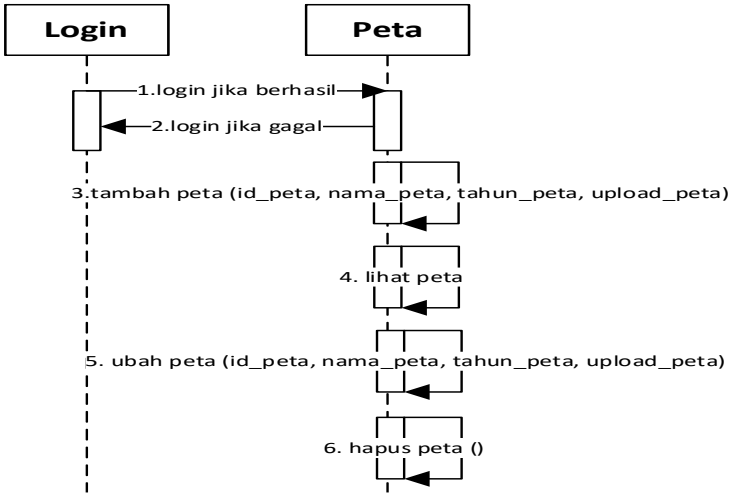

Figure 5 Sequence Diagram of add_Peta

Based on Figure 5 describes the sequence diagram of add Map, consists of two objects, namely login and Map. Map object requires login first from login object to add map, view map, modify map and remove map with attribute id_peta, name_peta, year_peta and upload_peta.

3) Activity Diagram

The proposed activity diagrams are as follows:

1. Activity Diagram Admin

Activity diagram admin explains that after login will view admin page. The activity occurs after admin page view is add which consists of entering id_admin, admin_name and nidn_admin. Another activity is change admin by admin which consists of changing id_admin, admin_name and

nidn_admin. Remove activity and see what admin will be done. The proposed admin activity diagram can be seen in Figure 6

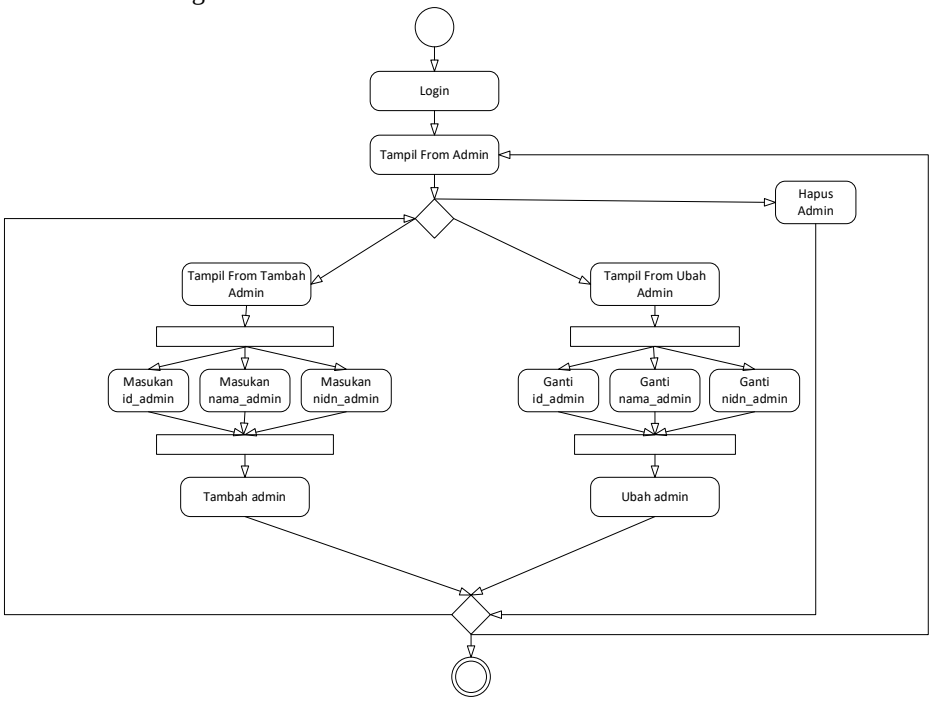

Figure 6 Activity Diagram admin

2. Activity Diagram Map

The activity diagram map explains that after loggin will view map page. The activity occurs after map page view is add map which consists of enter id_peta, name_peta, year_peta and upload_peta. Another activity is change the map which consists of change map_id, map_name, map_year and map_upload. The last activity is remove map which will be done by admin. The activity diagram of the proposed map can be seen in Figure 7

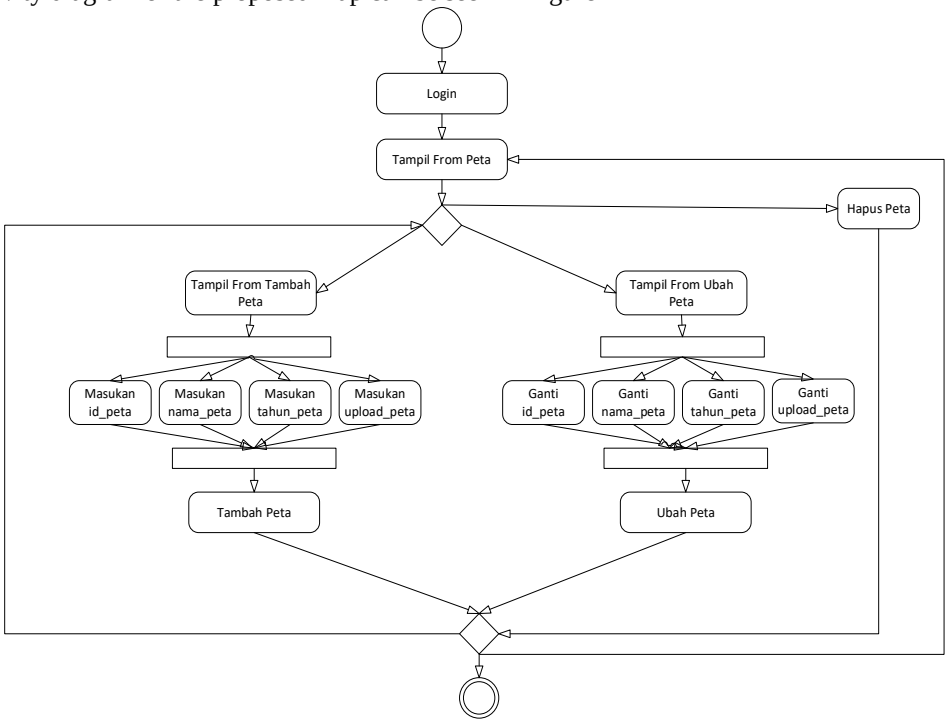

Figure 7 Activity Diagram Map

2.2.2 Database Design

Database design on this system is designed using table relations. Table relations describe the relationship between tables in database. The table relations proposed in this system can be seen in the following figure.

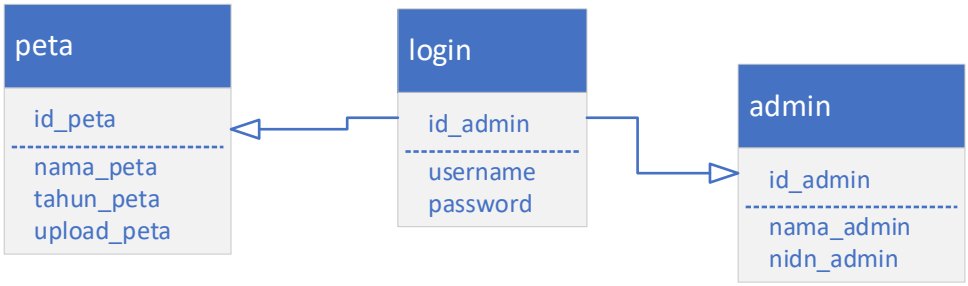

Figure 8 Table Relation

Based on Figure 8 describes table relation, it has relationship between tb_peta table with id_peta attribute as primary key and tb_login table with id_admin attribute as foreign key.

3. Result and Discussion

3.1. Main Page View

Main page view is the first page on website access. This page will display map image containing dots, lines and colors from the development of small industries in North Jayapura. There is textbox of map name, map_year of combo box and map search button. The main page design can be seen in Figure 9.

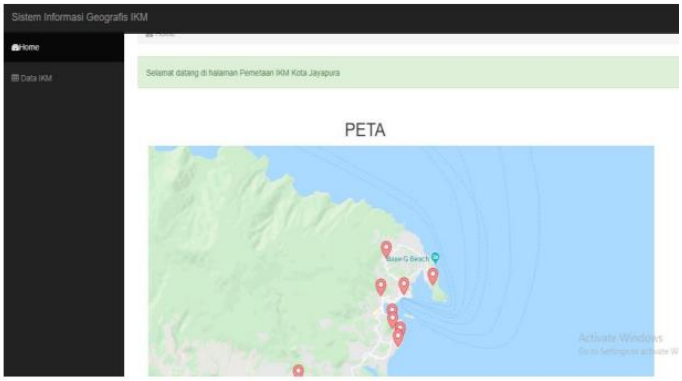

Figure 9 Main Page View

3.2. Login Page View

Login page is login page was used by admin to enter admin page. The design of login page can be seen in Figure 10.

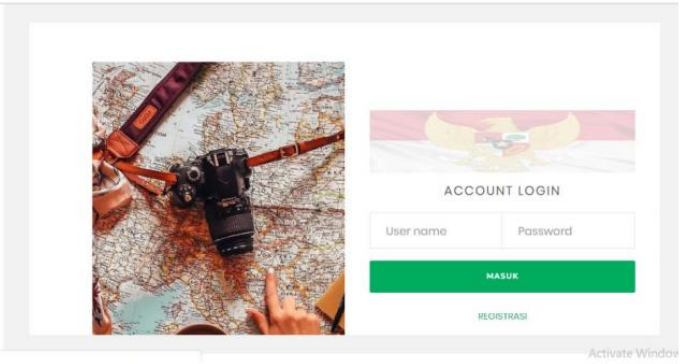

Figure 10 Login Page View

3.3. Admin Main Page View

Admin main page is the first page after admin login. This page will display several tool boxes. Toolbox admin is to go to the page that will view, add, change and remove admin. Tool box map is to go to the page that will view, add, change and remove the map. The design of admin main page can be seen in Figure 11.

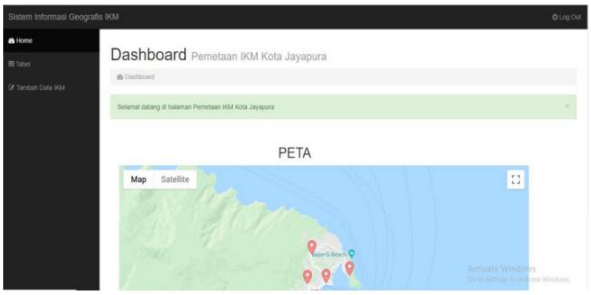

Figure 11 Admin main page view

4. Conclusions

Based on the results of discussion of Geographic Information System research on the Development of Small Industries during Pandemic, the conclusions that can be concluded are as follows:

1. This research produces geographic information system to display information in the form of location, color, image, and color of the Development of Small Industries During Pandemic in North Jayapura.
2. Small Industry Owners can find out the level of development of each Small Industry in North Jayapura.
3. With this geographic information system, the results of information on the development of small industries can be used as benchmark for Industrial Sector to solve problems of decrease, increase and stability were experienced by small industries in the north Jayapura.
4. As a place for development information to help small industries, especially local people, in experiencing marketing problems during pandemic.

References

[1] N. W. Al-Hafiz and F. Haswan, "Sistem Informasi Monografi Kecamatan Singingi," *J. INSTEK (Informatika Sains dan Teknol.*, vol. 3, no. 1, pp. 1–10, 2018, doi: 10.24252/instek.v3i1.4764.

[2] S. S. Maesaroh, "Upaya Peningkatan Daya Saing Usaha Mikro, Kecil, dan Menengah (UMKM) Kota Tasikmalaya melalui Pemanfaatan System Informasi Geografis (SIG)," *J. Ilmu Manaj. Dan Bisnis*, vol. 11, no. 1, pp. 61–74, 2020, doi: 10.17509/jimb.v11i1.21148.

[3] N. W. Al-Hafiz and M. H. Siregar, "GEOGRAPHIC INFORMATION SYSTEMS FOR THE DISTRIBUTION OF COMMUNITY SERVICE ACTIVITIES IN," *J. INFOKUM*, vol. 10, no. 1, pp. 236–243, 2021.

[4] S. Kawangkoan, N. D. Sekeon, Y. D. Rindengan, and R. Sengkey, "Perancangan SIG Dalam Pembuatan Profil Desa," vol. 5, no. 1, 2016.

[5] A. H. Fatta, *Analisis dan Perancangan Sistem Informasi untuk Keunggulan Bersaing Perusahaan dan Organisasi Modern*. 2007.

[6] M. D. Cahyono, K. I. Satoto, and R. Kridalukmana, "Sistem Informasi Manajemen Pemesanan Dan Penjualan Pada UNDIP Distro," *J. Teknol. dan Sist. Komput.*, vol. 3, no. 3, p. 370, 2015, doi: 10.14710/jtsiskom.3.3.2015.370-378.

[7] M. H. Siregar, "INFORMATION SYSTEM DESIGN OF SHAHIRAH RAHMAWATI DENTIST ' S PRACTICE BASED ON WEB AND SMS GATEWAY USING THE RATIONAL UNIFIED PROCESS METHODOLOGY," vol. 4, no. 1, pp. 85–92, 2021, doi: 10.36378/jtos.v4i1.1393.

[8] A. S. Rosa and M. Shalahuddin, "Rekayasa Perangkat Lunak Terstruktur dan Berorientasi Objek," *Inform. Bandung*, 2014.

[9] Yurindra, *Software Engineering*. Yogyakarta: Deepublish, 2017.

[10] I. putu A. E. Pratama, *Sistem Informasi dan Implementasinya*. Bandung: Informatika, 2014.

[11] M. H. Siregar, "Design of Wireless Computer Network Infrastructure in Implementation of Kemendikbud Distributed Information Systems in Singingi Kuantan Islamic University," *J. Mantik*, vol. 4, no. November, pp. 31–38, 2020, [Online]. Available: http://iocscience.org/ejournal/index.php/mantik/article/view/882/595.