INTEGRATION OF GEOSPATIAL AND CITIZEN PARTICIPATION USING GEOGRAPHIC INFORMATION SYSTEM FOR SMART CITY: A STUDY OF PRIORITY VILLAGES PROGRAM IN JAKARTA, INDONESIA

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ABSTRACT:

Jakarta, the capital city of Indonesia, is the city with the largest population in Indonesia with a population of 10,609,681. In line with the rapid growth and the increment of the population in Jakarta lead to the increment in the number of buildings in Jakarta. However, the building increment in Jakarta leads to the emergence of buildings ownership problems. Meanwhile, the increasing urbanization promotes the need for a system that accommodates the smart city concepts which require complex interactions between governments and citizens. Therefore, the Jakarta Provincial Government established a breakthrough program called Priority Villages, a program that integrates geospatial and citizen participation using the Geographic Information System (GIS) for the smart city planning model. This program focused on the distribution acceleration of building establishment decision letters. This research aims to visualize the concept and advantages of the Priority Village program as an analysis-oriented application for the development of intelligent city concepts. The outputs of the Priority Villages program are the issuances of 112 building establishment decision letters per region and 7,534 building establishment decision letters per individual building. The integration of geospatial and citizen participation using Geographic Information System (GIS) in Priority Villages program strongly supports the sustainability of the Jakarta Smart City program, shortening the Estimated Time of Arrival (ETA) of the building establishment decision letter making from 16 days to 7 days and give the positive impact on the broader citizen in Jakarta.

1. INTRODUCTION

Ntafalias et al (2021) have shown that in recent years, the world's population living in cities has been rapidly increasing. According to United Nations (2018), about 68% of the world's population is projected to live in urban areas by the year 2015. Ntafalias et al (2021) have revealed that cities will be required to transform their infrastructures in a smarter, more efficient, and resilient way so that sustainable development forms part of their long-term strategy and a better quality of life is assured to their citizens. Thus, the city infrastructure need to adapt the smart city approach to their citizens due to the rapid population growth in urban areas.

Cocchia (2014) has shown that smart city is the most used terminology in literature to indicate the transformation of urban areas. Meanwhile, European Commission (2022) defined a smart city as a place where traditional networks and services are made more efficient with the use of digital and telecommunication technologies for the benefit of its inhabitants and business. However, the smart city can not be achieved without support from other elements. Pereira et al (2018) have shown that the smart city can not be achieved without the support of smart governance because smart governance also has an important role in smart city initiatives, which require complex interactions between governments, citizens, and other stakeholders. Lim et al (2022) have shown that smart governance mainly refers to participatory governance, which emphasizes participation in decision-making and transparency through new communication channels for the citizen to use. Aurelia et al (2017) have defined participatory governance as the genuine participation of citizens and other organizations in the formulation of policies and strategies, the public sector's decision-making process, and the implementation of those decisions. Lim et al (2022) have defined that participatory governance is widely viewed as an essential element of realizing planned smart cities. Meanwhile, Anugraha et al (2020) have shown that the support from one of Geospatial data namely social sensing data can aid policymakers in linking human activities to socioeconomic consequences. Therefore, the integration between geospatial and citizen participation needs to be adopted for the development of a smart city.

Jakarta, the capital city of Indonesia, is the city with the largest population in Indonesia with a population of 10,609,681 according to BPS-Statistics of DKI Jakarta Province (2021). In line with the rapid growth and the increment of the population in Jakarta lead to the increment in the number of buildings in Jakarta. Residential houses and business places are examples of buildings built by citizens in Jakarta. The building increment in Jakarta leads to the emergence of buildings ownership problems due to the citizen do not understand the restriction of building establishment in specific zoning maps and the issues of document completeness for the submission of building establishment decision letters. Meanwhile, Woods (2019) has shown that increasing urbanization promotes the need for application-oriented analysis options for the development of intelligent city concepts.

Therefore, the Jakarta Provincial Government established a breakthrough program called Priority Villages. In this program, the Jakarta Provincial Government has the main focus on distribution acceleration of building establishment decision letters to certain villages selected based on area and citizen‘s

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characteristics. During the development stage, the program was launched in two versions, namely Priority Villages version 1.0 (older version) and Priority Villages version 2.0 (latest version). Priority Villages version 2.0 integrates the geospatial and citizen participation using the Geographic Information System (GIS) for the smart city planning model. Rolwes et al (2021) have shown that the use of geospatial data often builds the basis for planning decisions in smart cities.

During the program development stage of Priority Villages version 1.0, many obstacles were found in the program. Most of the obstacles occurred due to manual processes still dominated on the program. The documents provided by the citizen to the officer are still in paper form. The officers need time around 2 months to ensure the documents provided by citizens are correct. Moreover, the program also does not visualize the zoning map so the citizen does not understand the restriction of building establishment in specific zoning maps. These reasons make the Priority Villages version 1.0 not efficient and very consuming time. Therefore, the Priority Villages version 2.0 was established to replace the Priority Villages version 1.0.

This study aims to visualize the concept and advantages of analysis-oriented application for the development of intelligent city concepts. The Priority Villages version 2.0 were selected as the analysis-oriented application by integrating the geospatial and citizen participation using Geographic Information System (GIS) as the smart city planning model.

2. METHODS

This section describes the study area and the methodological framework to visualize the concept and advantages of Priority Villages version 2.0 for the development of intelligent city concepts (Figure 1). This study integrates geospatial and citizen participation using Geographic Information System (GIS) as the analysis-oriented application.

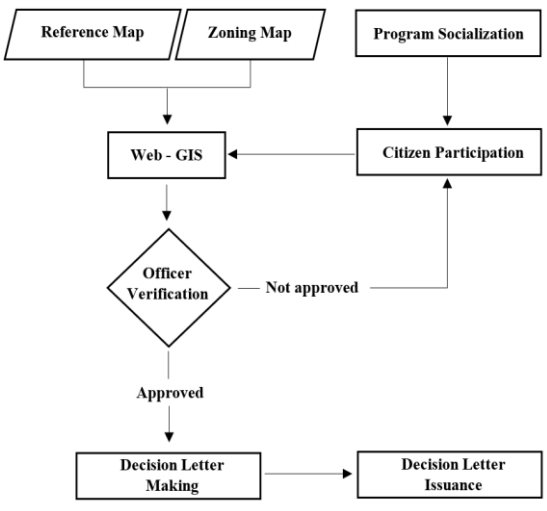


Figure 1. Methodological framework of Priority Villages version 2.0

2.1 Study Area

Jakarta City in Indonesia, comprises the districts of Central Jakarta, North Jakarta, South Jakarta, West Jakarta, and East Jakarta. In this study, North Jakarta, South Jakarta, and East Jakarta are selected as the study area. The study area covers approximately 62.2 hectares. Table 1 shows the details of the villages in those districts that were selected based on area and citizen's characteristics as the study area. Figure 1 shows the location of urban villages where the selected villages are located in this program.

No	Village	Area (ha)	Urban village	District
1	Tanah Merah, 7th hamlet	15.1	Tugu Selatan	North Jakarta
2	Tanah Merah, 8th hamlet	8.3	Rawa Badak Selatan	North Jakarta
3	Tanah Merah, 9th hamlet	4.8	Rawa Badak Selatan	North Jakarta
4	Tanah Merah, 10th hamlet	2.9	Rawa Badak Selatan	North Jakarta
5	Tanah Merah, 11st hamlet	2.4	Rawa Badak Selatan	North Jakarta
6	Tanah Merah, 22nd hamlet	10	Kelapa Gading Selatan	North Jakarta
7	Guji Baru	3.6	Duri Kepa	West Jakarta
8	Sekretaris	0.6	Tanjung Duren Utara	West Jakarta
9	KAKC	0.4	Ancol	North Jakarta
10	Muka	6.9	Ancol	North Jakarta
11	Elektro	0.9	Penjaringan	North Jakarta
12	Marlina	1.2	Penjaringan	North Jakarta
13	Gedong Pompa	0.5	Penjaringan	North Jakarta
14	Rawa Timur	0.6	Kebon Jeruk	North Jakarta
15	Rawa Barat	1.9	Kebon Jeruk	North Jakarta
16	Kali Apuran	0.2	Kedaung Kali Angke	North Jakarta
17	Baru	1.9	Pondok Pinang	South Jakarta

Table 1. Details of village selected in study area

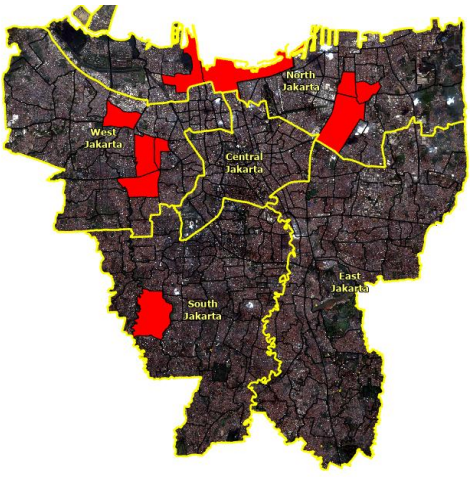


Figure 2. The location of urban villages (shown in red polygon) where the selected villages located in this program

2.2 Priority Villages version 1.0

The Priority Villages version 1.0 was launched on October 16th, 2021. The obstacles are found in Priority Villages version 1.0 that are the officers need to visit the citizen's building one by one to socialize the document completeness. The citizen needs to fill in their personal and building information in paper document form brought by the officer. After the citizen completes filling in the paper document, the officer needs to collect the paper documents from the citizen. Afterward, the officer needs to convert the paper documents to digital documents and publish them in the database.

The officers also need to mark the citizen's building one by one on the map (in paper form). Subsequently, the officer digitizes the citizen building boundary based on that map to the system. The other obstacle is found when the citizens need to revise their personal biodata or building information in paper documents. So that the officer needs to re-visit the citizen to help revise the paper documents. Finally, the officer needs to re-collect the new paper documents from citizens, re-convert the new paper document to new digital documents, and re-publish the new digital document to the database. All of these obstacles make the Priority Villages version 1.0 not efficient and very consuming time.

2.3 Priority Villages version 2.0

Based on many obstacles found in the Priority Villages version 1.0 program that are not efficient and very consuming time, the Priority Villages version 2.0 was established to replace the Priority Villages version 1.0. The Priority Villages version 2.0 was launched on February 25th, 2022. The aim of the Priority Villages version 2.0 is to simplify the whole process to become efficient and less-consuming time by using Web-GIS applications as the main system. The concept of the Web-GIS application is to integrate geospatial data and citizen participation. With this concept, the citizen is also able to contribute to the public sector's decision-making process.

2.4 Program Socialization

Program socialization is defined as the first step of the whole program of Priority Villages, where the officer socializes the concept, method, and open discussion to the citizen. In the program socialization of Priority Villages version 2.0, the officer faced tough challenges due to the need to socialize the integration of geospatial and citizen participation in Web-GIS application as the new method. Besides the officer demonstrating how to operate the Web-GIS application to the citizen, the officer also provides the opportunity for the citizen to try the application directly. The output of this program socialization is to help the citizen familiar to use the Web-GIS application.

2.5 Geospatial Data

In this research, a reference map and zoning map were used as the geospatial data for the Priority Villages version 2.0. The reference map and zoning map were integrated using Geographic Information System (GIS). GIS is a powerful tool for spatial analysis. Esri (2022) defines GIS as a spatial system for creating, managing, analyzing, and mapping all types of data by connecting data to a map and integrating the location data with all types of descriptive information. The purpose of the geospatial data integration is to visualize whether the citizen's building can have a building establishment decision letter or not. The concept of geospatial data integration is to map the citizen's building location on the zoning map. In addition, the Priority Villages version 2.0 also uses the neighborhood boundaries map to visualize the neighborhood boundaries in each selected village.

2.5.1 Reference Map: The reference map shows the current condition of the buildings located in Priority Villages. The Priority Villages program uses the latest aerial map taken using Unmanned Aerial Vehicle (UAV) for the base map. The latest aerial map is used as a base map for Web-GIS for the next process of citizen participation. The area covered when taking each aerial photo activity is 2-3 villages.

2.5.2 Zoning Map: The zoning map shows provision in the detailed spatial plan that visualizes the designation of a space land for citizen activities. Meanwhile, the detailed spatial plan is a document that contains the city's spatial plan for a period of up to 20 years. The Jakarta Government has an openly accessible zoning map obtained from the Department of Human Settlements, Spatial Planning and Land (Dinas Cipta Karya, Tata Ruang dan Pertanahan) of Jakarta. Figure 2 shows the zoning map in Jakarta. The zoning map contains 4 provisions namely permitted for citizen activities, limited for citizen activities, certain conditions for citizen activities, and not permitted for citizen activities.

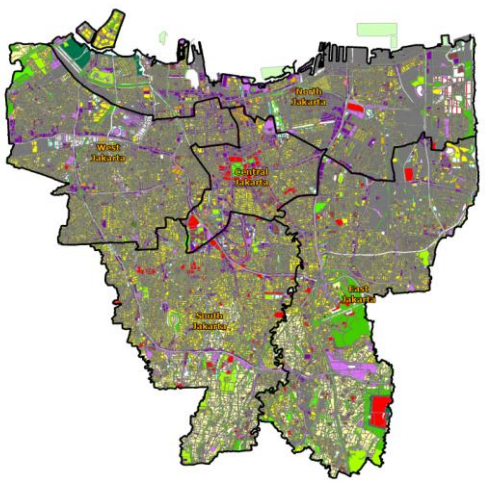


Figure 3. Zoning map of Jakarta

2.6 Web-GIS Application

Web GIS is a digital mapping platform based on Geographic Information System (GIS) by utilizing the internet network. ArcGIS Enterprise (2022) has defined Web GIS as a type of distributed information system, comprising at least a server and a client, where the server is a GIS server and the client is a web browser, desktop application, or mobile application. In its simplest form, Web-GIS can be defined as any GIS that uses web technology to communicate between a server and a client. Web-GIS can input, integrate, visualize, and distribute geospatial data that can be processed and displayed in real-time.

In this study, the Web-GIS application is developed using GIS software from ESRI, namely ArcGIS Pro. The Web-GIS integrates geospatial data and citizen participation. The reference map and zoning map are overlaid as the base map through Web-GIS. This base map will assist the next process of citizen participation. The advantage of using Web-GIS is the

process of citizen participation can be monitored in real time by the officer. The Web-GIS application uses a smart editor tool to accommodate citizen participation.

2.6.1 Smart Editor Tool: Smart editor tool is an interactive tool provided in ArcGIS Pro. Esri (2022) defines the smart editor tool as a tool that can be easily understood by the citizen and it is a modification from the conventional editing feature in Web-GIS. With the smart editor tool, the citizen can have more control over editing layers and tables and create a feature on the map. Citizens also can configure descriptions in the tables and the layers, create, update, delete related records, and view pop-ups from other data on the map while in editing mode.

2.7 Citizen Participation

Citizen participation is defined as how the citizen contributes to the public sector's decision-making process. In this study, citizen participation is described in 3 main steps. In the first step, the citizens mark the building they own by creating a polygon feature in the base map of the Web-GIS application. In the second step, the citizens input the personal and building attributes data in Web-GIS application using a smart editor tool. In the last step, the citizens upload the required files to the Web-GIS application. All 3 steps can be completed using Web-GIS application that can be opened with the hardware of a personal computer or mobile phone as long as the hardware is connected to the internet.

2.8 Officer Verification

The officers will verify and filter the data files sent by the citizen through Web-GIS. If the data is not in accordance with the provisions, then the officer will notify the citizen to revise the data via phone massage. Moreover, if the data is in accordance with the provisions, the officer will continue to the next process of decision letter making.

2.9 Decision Letter Making

The data that has been in accordance with the provisions, will proceed by the officer for decision letter making. The decision letter shows the name of the priority village, citizen's building location, citizen identity, building information, and building registration map that is overlaid with the zoning map. This decision letter was established by following the existing regional regulations in Jakarta Province.

2.10 Decision Letter Issuance

The final draft of the decision letter is then verified by the head of the Investment and One-Gate Integrated Services Department. If the final draft of the decision letter has been in accordance with the provisions, the head of the Investment and One-Gate Integrated Services Department gives the sign on the decision letter and the decision letter became the building establishment decision letter. The final step for the officer is to send the building establishment decision letters to the citizens.

2.11 Qualitative Description Observations

The SWOT (Strength - Weakness - Opportunities - Threats) analysis technique is selected as the analysis for qualitative description observation in this study. David (2016) has shown that the SWOT analysis technique is used to identify the internal factor (strengths and weaknesses) and external factor (opportunities and threats) of a program to determine the right strategy to achieve the program objectives. The first step in the SWOT analysis technique is to determine the strengths, weaknesses, opportunities, and threats in a program, then convert to Internal Factor Evaluation (IFE) and External Factor Evaluation (EFE) that contain the value of the weight, rating, and attractiveness scoring. The value of weight is in a range of not important until very important which is represented in the value of 0 – 1. The value of rating is in a range of under average response until very good response which is represented in the value of 1 – 4. Furthermore, the value of attractiveness scoring is obtained from the multiplication between the weight value and the rating value.

The next step is to calculate the total score and difference score in IFE and EFE. The scoring of IFE and EFE then need to be converted to IE (Internal-External) matrix and SWOT 4 Quadrant (SWOT-4K) matrix. The total score of IFE and EFE are connected with a line and represent the quadrant location in the IE matrix. Figure 4 shows the IE matrix explanation. Furthermore, the difference score of IFE and EFE are connected on the x, and y-axis and represent the quadrant location in the SWOT-4K matrix. and Figure 5 shows the SWOT-4K matrix explanation.

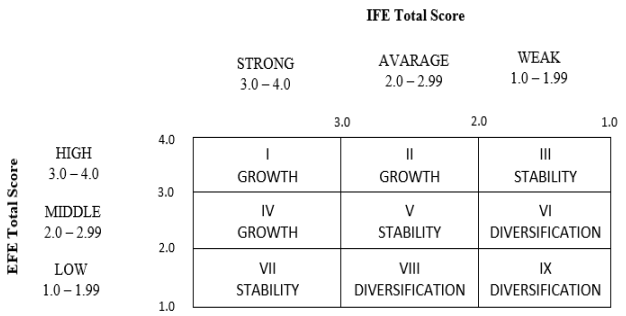


Figure 4. Internal-External (IE) matrix

Figure 5. SWOT-4K matrix

3. RESULTS AND DISCUSSION

To visualize the concept and advantages of analysis-oriented application of Priority Villages version 2.0 for the development of intelligent city concepts, we describe the results in Web-GIS application, officer verification, back-end process, decision letter issuance, program comparison, and qualitative description observations to fulfil the aforementioned research aims.

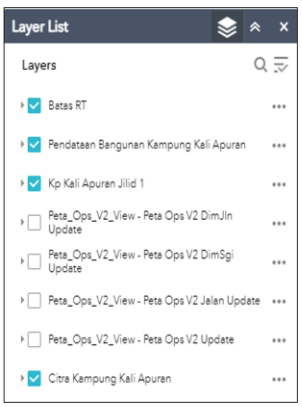
3.1 Web-GIS Application

The concept of the Priority Villages version 2.0 is to integrate the geospatial data and citizen participation through Web-GIS application. Figure 4 shows the interface of the Web-GIS application used in Priority Villages version 2.0.

Figure 6. Interface of Web-GIS Application

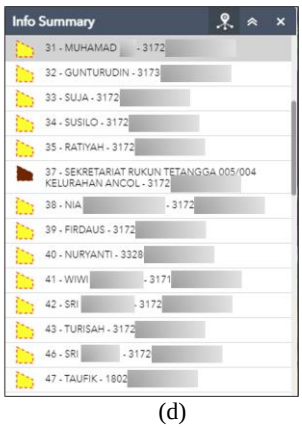
Figure 4 shows the base map in the interface of the Web-GIS application is overlaid with the reference map and zoning map. The reference map is indicated with the aerial map taken using Unmanned Aerial Vehicle (UAV). The zoning map is indicated with the colored polygons that has the attributes of the provision in the detailed spatial plan that visualizes the designation of a space land for citizen activities. The location of selected villages in this program is indicated in yellow boundaries. The Web-GIS application contains five main tools namely legend, layer list, smart editor, base map gallery, and info summary located in the upper right corner of the interface. Figure 5 shows the five main tools in the interface of in Web-GIS application.

(a)

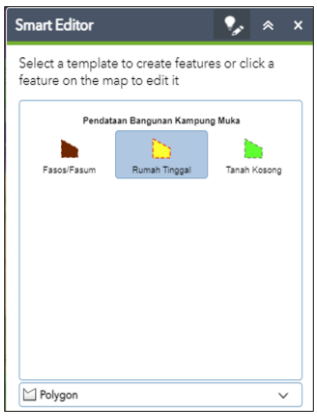


(b)

(c)



(d)



(e)

Figure 7. Main tools in interface of Web-GIS application: (a) legend; (b) layer list; (c) base map gallery; (d) info summary; (e) smart editor

Figure 5a shows the legend that contains in the base map of the Web-GIS application. The legend contains the boundaries of selected villages, building type, and zoning map with the provision attributes. Figure 5b shows the layer list that can be checked and uncheck to show and hide each layer. The layer list also can be configured for the transparency level in each layer. Figure 5c shows the gallery of the base map that can be changed as needed. Figure 5d shows the citizen who completed the process of citizen participation for submission of the building establishment decision letter, but still waiting for the verification by the officer.

In the Priority Villages version 2.0, citizen ables directly fill in their personal and building information through the Web-GIS application instead of filling in their personal and building information in paper documents. The citizens also able to mark their own building boundaries through the Web-GIS application. To fulfil those activities, the Web-GIS application provides smart editor tools. Figure 5e shows the smart editor tool for the citizen to complete the process of citizen participation. Before the citizen marks their own building boundaries on the base map, the citizen needs to select the polygon to be used according to the type of building as shown in figure 5e. Then the citizen digitizes the polygon field by clicking the left mouse on each corner point of their own building boundaries as shown in figure 6a. To complete the digitizing, the citizen needs to double click the left mouse on the last corner point of the building boundaries as shown in figure 6b.

(a) (b)

Figure 8. Digitizing the citizen's building boundary: (a) digitizing processing; (b) digitizing completed

After the citizen completed to mark their own building boundaries, the interface of the smart editor changes to attributes filling as shown in Figure 7. The citizen needs to input the attributes of their personal and building in the smart

editor. The citizen also needs to attach the required documents to the attachment column. In the last step, the citizens need to send the data to the database system by clicking the save button on the smart editor tool.

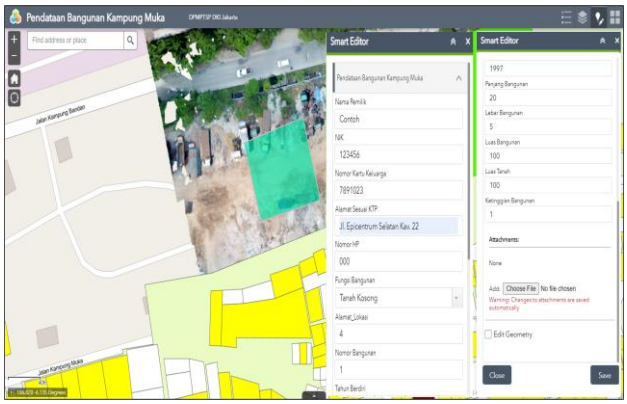


Figure 9. Smart editor interface of attributes filling

All the process in Priority Villages version 2.0 has been adopted to the digital system. With the digital system, when the citizens need to revise their personal and building information, the citizen ables to revise directly in Web-GIS applications through smart editor tools (the data will be synced automatically in the database).

3.2 Back-end Process

The data from citizen participation process through Web-GIS application then will be checked by the officer. To check the data from citizens, the officer needs to open the portal database as shown in Figure 8. Afterward, the officer downloads the data from citizen in excel format. In the excel data, officers check the data suitability between the file uploaded by citizens and the data attributes fill in by citizens. The officer also copies the file uploaded by citizens to different directory locations as a backup. The backup data process needs to be carried out to avoid if the Web-GIS application experiencing problems.

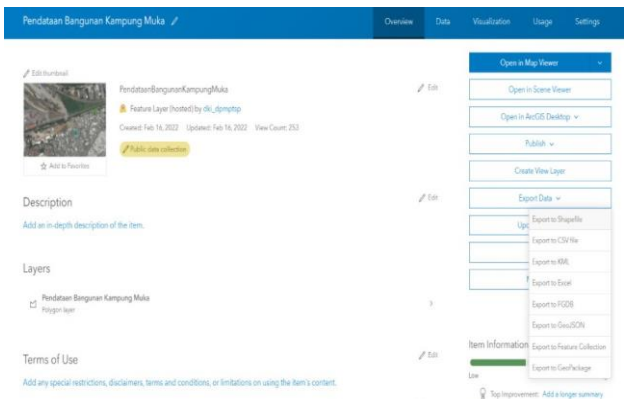


Figure 10. Database Portal of Web-GIS application

The last step in the back-end process is building map making. Before the building map making, the officer needs to download the polygon data of citizen's building boundaries in shapefile format from the database portal. The building map-making is created using GIS software from ESRI, namely ArcGIS Pro. Figure 9 shows the building map-making in one of the selected villages in this program.

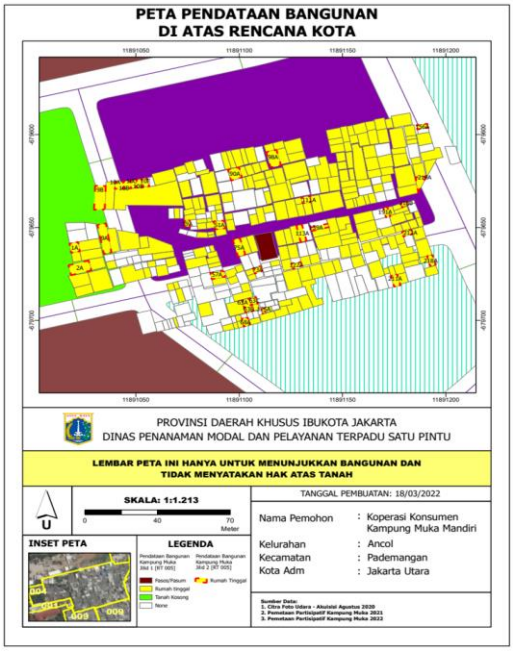


Figure 11. Building map of Priority Villages program

3.3 Decision Letter Issuance

The data from citizen that has been in accordance with the provisions, will proceed by the officer for decision letter making. The decision letter becomes the building establishment decision letter if the decision letter has been verified and signed by the head of the Investment and One-Gate Integrated Services Department. This decision letter was established by following the existing regional regulations in Jakarta Province. The final output results in Priority Villages version 2.0 are divided into two types, namely building establishment decision letter per region and building establishment decision letter per individual building. The outputs of the Priority Villages program are the issuance of 112 building establishment decision letters per region and 7,534 building establishment decision letters per individual building.

3.4 Program Comparison

The aim of the Priority Villages version 2.0 is to simplify the whole process to become efficient and less-consuming time by using Web-GIS applications as the main system. Table 2 shows the general comparison between Priority Village version 1.0 and Priority Village version 2.0

General Comparison		
No	**Priority Villages version 1.0**	**Priority Villages version 2.0**
1	Program utilizes non-digital system, use a lot of papers	Program utilizes digital system, paperless
2	The system requires officer to collect and digitalize the data from citizen	The system requires citizen to input the data
3	When the citizen revises the data, officer need to re-collect, re-digitalize and verified the data	When the citizen revises the data, officer verified the data directly from the system
4	Estimated Time of Arrival (ETA) program requires 16 days	Estimated Time of Arrival (ETA) program requires 7 days

Table 2. General program comparison

Table 3 shows the detailed comparison of Estimated Time of Arrival (ETA) between Priority Village version 1.0 and Priority Village version 2.0

Priority Village version 1.0			**Priority Village version 2.0**		
Step	**Procedure**	**ETA**	**Step**	**Procedure**	**ETA**
1.	Program Socialization	1 day	1.	Program Socialization	1 day
2.	Data Collecting	1 day	2.	Citizen Participation	1 day
3.	File Requirements Submission	6 days	3.	Web-GIS	2 days
4.	File Verification	2 days			
5.	Digitization Mapping	1 day			
6.	Insert Attribute Data to Polygon	3 days	4.	Verification Officer	1 day
7.	Decision Letter Making	1 day	5.	Decision Letter Making	1 day
8.	Decision Letter Issuance	1 day	6.	Decision Letter Issuance	1 day
Total		**16 days**	**Total**		**7 days**

Table 3. Detail of Estimated Time of Arrival comparison

3.5 Qualitative Description Observation Results

The analysis method of the study was done through qualitative descriptive observation. The qualitative descriptive observation indicates the internal factor and external factor affecting the program of Priority Villages version 2.0. Table 2 shows the analysis of qualitative descriptive observation in this program.

Internal Factors	
Strengths	Weaknesses
• Shortening the Estimated Time of Arrival (ETA) program from 16 days to 7 days • Supports sustainability due to adopting the digital-system process and paperless. • Required data by officer is available on the database that is always synchronized	• Devices used for citizen participation process must be connected with the internet • Devices used for citizen participant process must be released in 2015 and above • Web-GIS technology can have a high cost for maintenance
External Factor	
Opportunities	Threats
• Web-GIS application has the user-friendly interface. • Citizen participation process can be done everywhere and using any devices	• Vulnerabilities to the data security due to data stored in online portal database

Table 4. Details of qualitative descriptive observation

Table 5 shows the details of internal factor scoring of each strength and weakness that has been identified in the program. Table 6 shows the details of external factor scoring of each opportunity and threat that has been identified in the program.

Internal Factor				
Number	Strengths	Weight	Rating	Attractiveness Score
1.	Shortening the Estimated Time of Arrival (ETA) program from 16 days to 7 days	0.3	4	1.2
2.	Supports sustainability due to adopting the digital-system process and paperless	0.05	3	0.15
3.	Required data by officer is available on the database that is always synchronized	0.2	3	0.6
Sub Total		**0.55**		**1.95**
Number	Weakness	Weight	Rating	Attractiveness Score
1.	Devices used for citizen participation process must be connected with the internet	0.2	3	0.6
2.	Devices used for citizen participant process must be released in 2015 and above	0.15	3	0.45
3.	Web-GIS technology can have high-cost maintenance	0.1	3	0.3
Sub Total		**0.45**		**1.35**
Score Total		**1**		**3.3**
Difference Score				**0.6**

Table 5. Details of internal factor scoring

External Factor				
Number	Opportunities	Weight	Rating	Attractiveness Score
1.	Citizen participation process can be done everywhere and using any devices	0.4	4	1.6
2.	Web-GIS application has the user-friendly interface	0.2	4	0.8
SubTotal		**0.6**		**2.4**
Number	Threats	Weight	Rating	Attractiveness Score
1.	Vulnerabilities to the data security due to data stored in online portal database	0.4	3	1.2
SubTotal		**0.4**		**1.2**
Total Score		**1**		**3.6**
Difference Score				**1.2**

Table 6. Details of external factor scoring

Figure 12 shows the program is located in quadrant I of growth in the Internal-External matrix based on the calculation of the total score total between internal factor scoring and external factor scoring. Figure 13 shows the program is located in quadrant I of growth in the SWOT-4K matrix based on the calculation of the difference score total between internal factor scoring and external factor scoring.

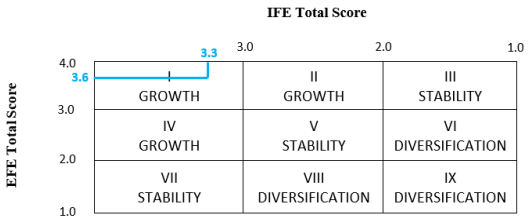


Figure 12. Internal-External matrix result

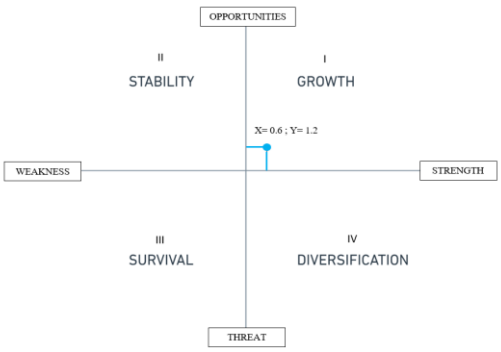


Figure 13. SWOT-4K matrix result

The program is located in the growth quadrant (quadrant I) both in the IE matrix and SWOT-4K matrix. Therefore, the program indicates has the strengths to take advantage of opportunities for broader citizen in Jakarta.

4. CONCLUSION

The Priority Villages version 2.0 was established due to the Priority Villages version 1.0 is not efficient and very consuming time. The aim of the Priority Villages version 2.0 is to simplify the whole process in Priority Villages version 1.0 to become efficient and less-consuming time. To fulfil the aim of the Priority Villages version 2.0, the new method was introduced by integrating the geospatial data and citizen participation using the Web-GIS application. The use of Web-GIS application was selected as the smart city planning model. The program also gives space for the citizen to contribute to the public sector's decision-making process as an essential element of realizing planned smart city.

The analysis method of the study was done through the qualitative descriptive observation that indicates the program has the strenght to take advantage of any opportunities. The final output results in Priority Villages version 2.0 are divided into two types, namely building establishment decision letter per region and building establishment decision letters per individual building. The outputs of the Priority Villages program are the issuance of 112 building establishment decision letters per region and 7,534 building establishment decision letter per individual building.

A comparison between Priority Villages version 1.0 and Priority Villages version 2.0 are provided. The comparison results show that the Priority Villages version 2.0 can simplify the whole process to become efficient and less-consuming time (shortening the Estimated Time of Arrival (ETA) of the building establishment decision letter from 16 days to 7 days). The Priority Villages version 2.0 strongly supports the sustainability of Jakarta Smart City due to adopting the digital-system process and paperless. Therefore, the Priority Villages version 2.0 gives the positive impact on the broader citizen in Jakarta.

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