Eduvest – Journal of Universal Studies
Volume 5 Number 2, February, 2025
p- ISSN 2775-3735- e-ISSN 2775-3727

DEVELOPMENT OF MOBILE AND SPATIAL BASED SMART COMMUNITY APPLICATIONS TO IMPROVE THE COMMUNITY ECONOMY

Ionia Veritawati[1], Adi Wahyu Pribadi[2], Amir Murtako[3], Bambang Riono[4]
Faculty of Engineering, Universitas Pancasila, Indonesia [1,2,3,4]
Email: ionia.veritawati@univpancasila.ac.id, adi.wahyu.p@univpancasila.ac.id, amir.murtako@univpancasila.ac.id, bambang.riono@univpancasila.ac.id

ABSTRACT

The economy in Depok Community is a problem, where the community needs support from the surrounding community and stakeholders in developing its economy. In planning, Depok is planned to become a smart city. Smart community is part of a smart city with a concept that includes technology-people-innovation in developing society. For this reason, this research developed the Smart Community concept which uses mobile and spatial-based technology to help improve the economy of its citizens, including MSME business actors in the sub-district area, especially in Cilodong Sub-district in this case study. The application development method uses the water fall methodology and an object-oriented approach. The results obtained, the application developed can be used by citizens to share information and communicate to help the citizens' economy, one of which is online marketing, and assisting stakeholders in monitoring and providing support in economic matters.

KEYWORDS smart community, smart city, smart economy, mobile based application, spatial based application

INTRODUCTION

Depok as one of the cities that is part of the expansion of the capital Jakarta, is directed to become a smart city. Depok is an alternative place to live, where the population is increasing, and the community is also increasing. As the community grows, various needs develop, including economic, social, health aspects to security. From economic and social aspects, SMEs grow with various creative products. Thus, the sub-districts in Depok, as well as the level below that represent the community, have the potential to become smart communities.

There are six components of the smart city concept, namely smart governance, smart economy, smart live, smart living, smart people, and smart

How to cite: Ionia Veritawati, et al. (2025). Development of Mobile and Spatial Based Smart Community Applications to Improve the Community Economy. *Journal Eduvest*. *5*(2), 1334-1349
E-ISSN: 2775-3727

mobility. The concept of Smart Community is one of the dimensions of a smart city (Hidayat, 2018). Smart community is a branch of smart city that focuses on developing an area that is limited to a specific community. Currently, in Indonesia there are three cities that can be referred to as smart cities, namely Jakarta, Bandung, and Surabaya (Widodo, 2016). This concept is followed by other cities, such as in Muko-muko Regency, Bengkulu province, where Smart city is implemented through the development of e-government governance in the area (Annisah, 2018).

Economically, the concept of smart economy, which is the focus of research, in Depok has aspects of business opportunities, resources and capital. Welfare and sustainable growth. In terms of implementation, the smart economy target creates an ecosystem that supports community economic activities that are in line with regional leading economies that are adaptive to changes in the current information age, as well as increasing people's financial literacy through various programs (Pradono, 2020).

The Depok City Government has problems in dealing with MSME actors, reducing unemployment and poverty rates, and increasing people's purchasing power. For this reason, the city government intends to improve workforce skills and realize 5000 new entrepreneurs, develop MSMEs and MSME training, mentoring to collaboration and the introduction of online marketing. Another program is to embrace and optimize cooperatives, as well as Smart society, with a single window application, which can support the smart economy (Samih, 2019).

Similar problems in the Depok City area, it is informed that it is an economic problem. This is attributed to the growth rate of economists i, as well as low income, high unemployment rate (Lindskog, 2004). For this reason, support for residents from the city government or support between residents is needed to be able to overcome existing economic problems. Roadmap

The urgency of this research is the initial stage of research to build a smart society, where the end of the research roadmap is that communication can be carried out between the community and the community with the authorities to create a comfortable smart society in the city where they live. Meanwhile, the purpose of this study is to provide alternative solutions to economic problems in the city of Depok by developing the concept of smart community and associated with the smart economy component, which involves the community of Depok city residents and the city government (Firdaus & Firdaus, 2021). For this reason, an application (software) was developed with 2 complementary platforms, namely:

1. The "Depok Cerdas" application: mobile-based to help residents/communities in the Depok city area can:
   - Sharing information related to the economy
   - Support each other and transact with each other
   - Helping people in the community to get jobs at the local level, get information on business training or product exhibitions
   - Information on the distribution of MSMEs in the nearest location for labor market opportunities, so that it can reduce the unemployment rate and accelerate economic growth
   - Helping MSME businesses get local, location-based labor

- Helping MSME business people conduct online marketing for the surrounding community (Negara & Emmanuel, 2019)

2. Web-based and spatial applications to assist the Depok city government in monitoring in accelerating decision-making in handling citizens' economic problems, where it can:
   - Viewing the mapping of the distribution of business areas
   - Monitoring the exchange of economic information, in particular, between citizens, so that it can provide support
   - Viewing Trend Information in Charts

The benefit of the research is that Depok residents can communicate with each other, as well as with the leaders of the city/sub-district area, so that the economy can be developed locally in the Depok area.

RESEARCH METHOD

The proposed research method can be seen in figure 1.

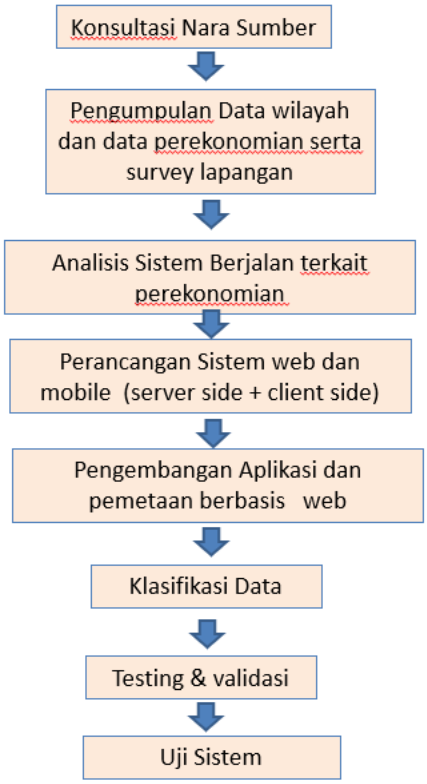

Figure 1. Workflow of the Proposed Research Method

The proposed measures are as follows:

1. Consultation of the research team to resource persons from Depok community activists.
2. Data collection of community conditions through interviews with resource persons.

3. Object-oriented analysis and design for mobile-based applications (client side) for citizens and web-based (server side) for city governments/stakeholders
4. The application development in point 3, spatial-based, which is interactive, along with a database that stores spatial data and attribute data (non-spatial). It can be used by the government and the public in general.
5. Data collection from the community through a mobile-based application, starting with socialization, with a sample of Cilodong sub-district and Sukamulya Village in the city of Depok.
6. Text-based and spatial data processing and analysis. The data collected is related to MSME data and existing products, text data processing from citizen information descriptions
7. Data validation and Application testing using the black box method (Souza et al., 2019).

RESULT AND DISCUSSION

Analysis and Planning

System analysis and application design - Smart Community information system: Consists of a use case diagram (figure 2), a Sequential diagram describing the scenario of the use case (figure 2), one of which is Create Information (Figure 3). As well as a Class diagram (figure 4), and a spatially related Citizen Profile Relationship (figure 5)

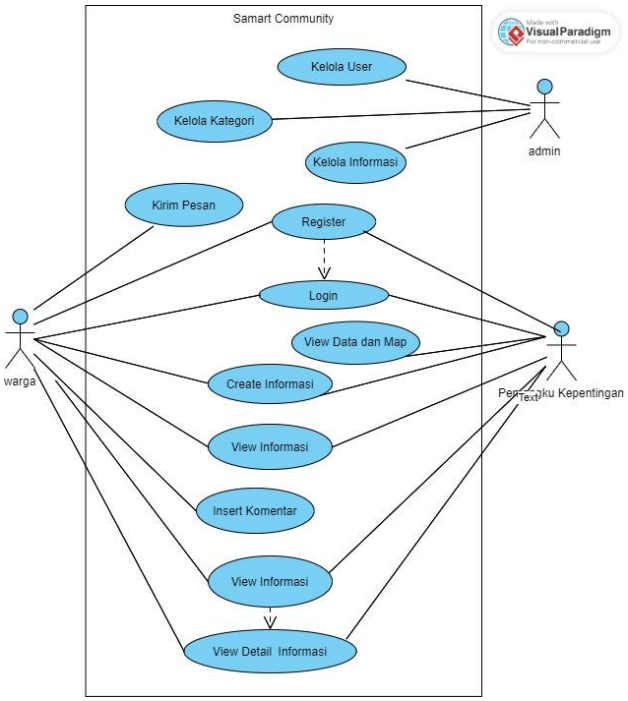

Figure 2. Diagram Uses Case "Smart Community"

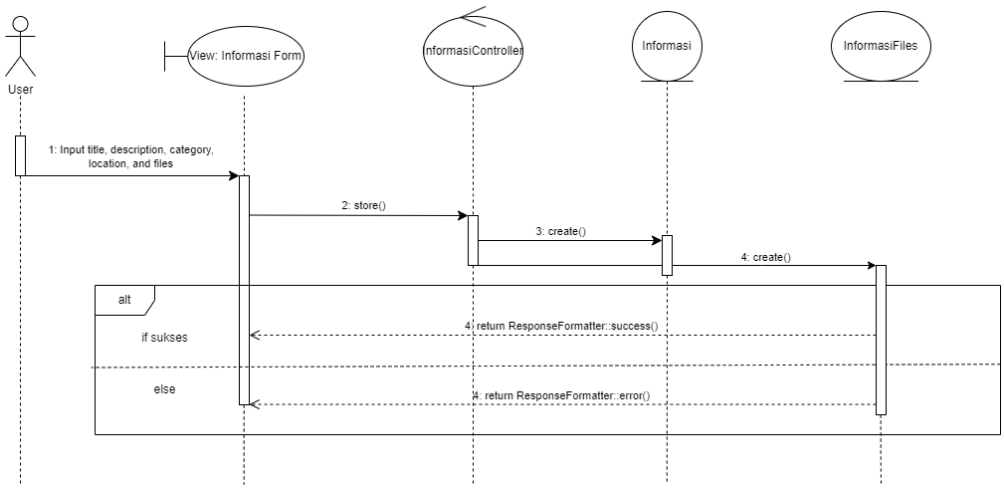

Figure 3. Sectional Diagram – Create Information

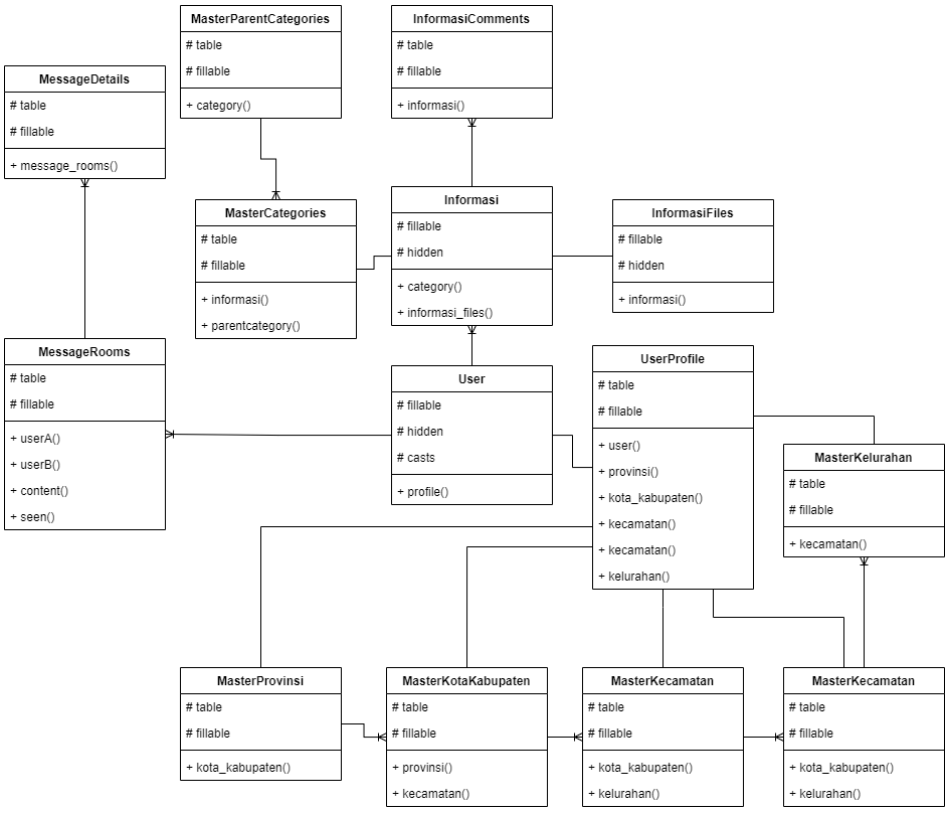

Figure 5. Classroom Diagram

Figure 5. User Profile Relationship (resident) to the Location of His Residence

Implementation and Discussion of Results

Implementation of mobile-based software development (Client Side). Information System - Smart Community – on the Client Side – with the name: "Depok Cerdas" with a file (.apk) installed on the mobile phone (android – in this version). This software is connected to a server database so that registration can be carried out as well as filling in and storing data. Figure 6 shows a series of displays of the "Depok Cerdas" application from installation, login, to the display of information and existing categories – related to the economy (Mohapatra & Panda, 2019).

Information about the economy, including information on MSEs and their spatially-based products, can be accessed (figure 7), where this media can be a marketing medium to residents around Depok. In addition, residents can communicate by direct message, if more detailed information is needed and residents can comment on the message given (figure 8).

In addition to information related to the economy, residents can communicate between residents and also with the authorities to provide input – related to the economy and also social, according to the categories provided (figure 9a). Access citizen information and filter according to the nearest location. For example, when residents access the nearest location in the Sukmajaya sub-district, the application displays information located in Cilodong sub-district, where the two sub-districts in the city of Depok are adjacent (figure 9b).

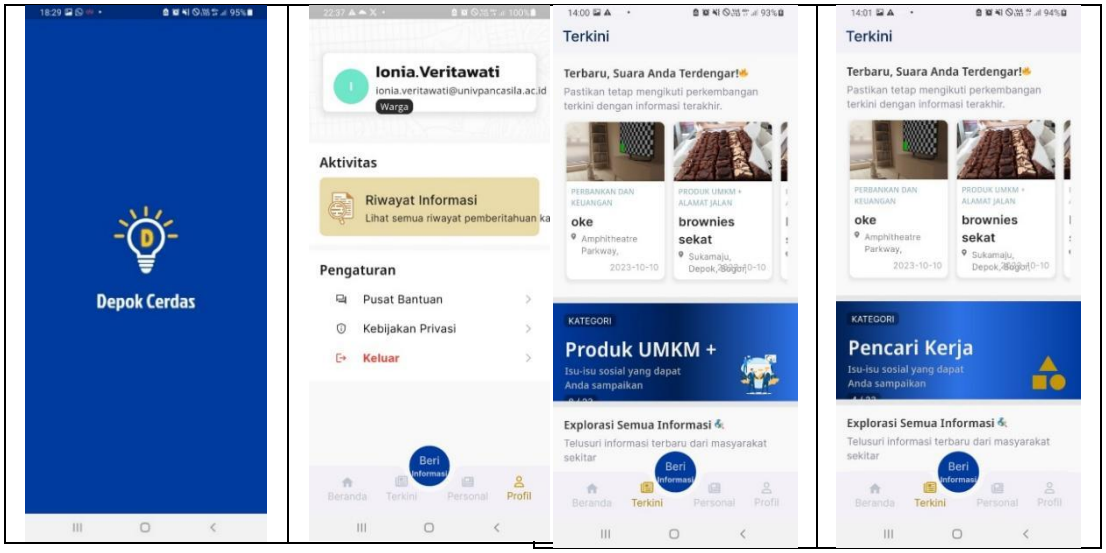

Figure 6. Mobile-based applications (Client Side)

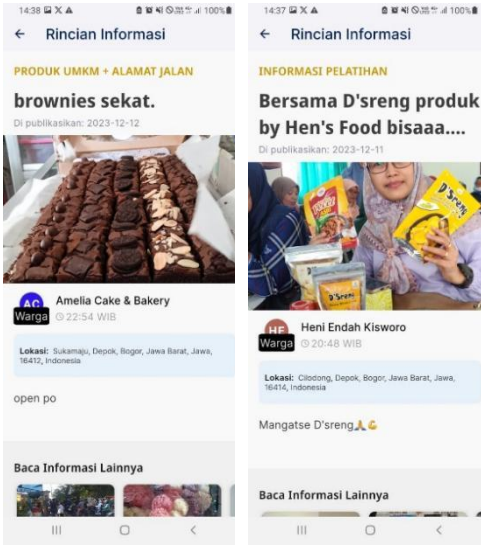

Figure 7. Information on MSMEs and Their Products in Spatially Based Depok (Location)

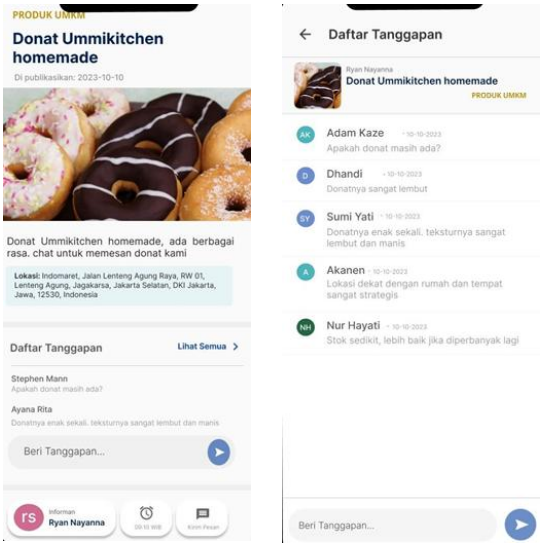

Figure 8. Process of Sending Messages and Commenting – MSME Products

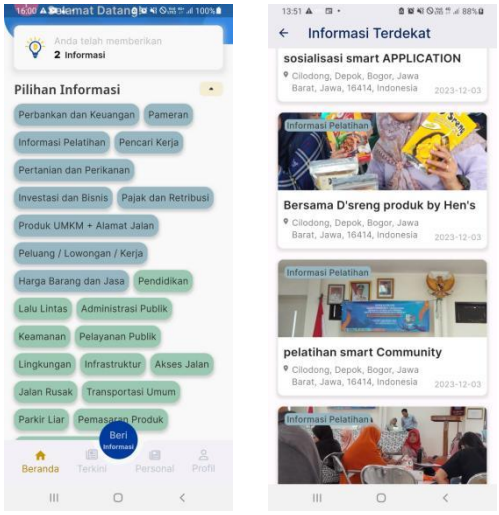

Figure 9. (a). List of Categories and (b). Nearby Information

Creation of web-based software (Server Side), where:

- Managing Information: a spatially based list and detail of information (figures 11a and 11b)
- Managing categories – related to information or inputs, regarding the economy (figure 11)
- Managing spatial data of the Depok region (figure 12)
- Managing the distribution of information related to spatial-based categories (figure 13)

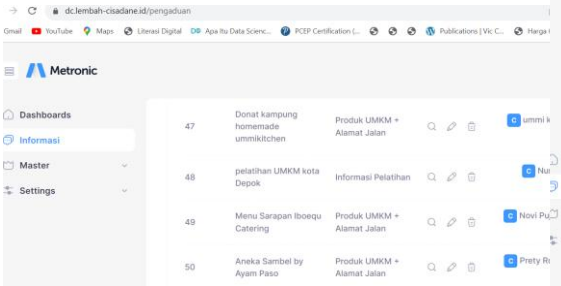

Figure 10a. Spatial-Based Information Management

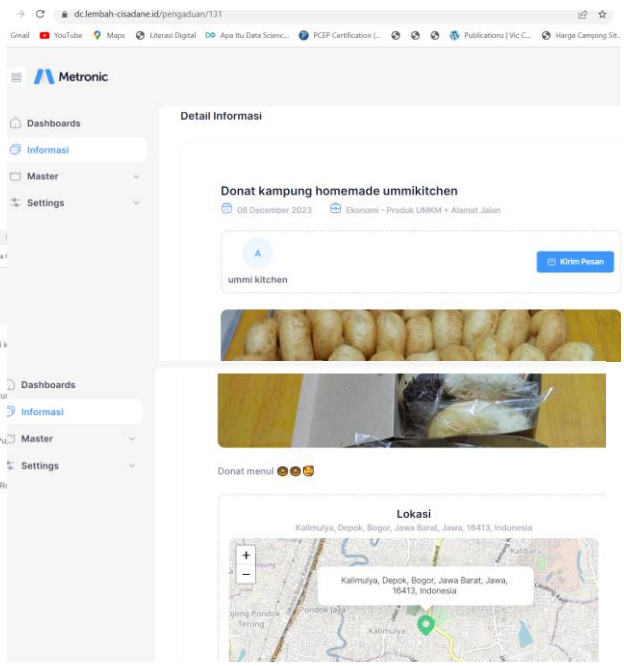

Figure 10b. Spatially-Based Information Detail Management

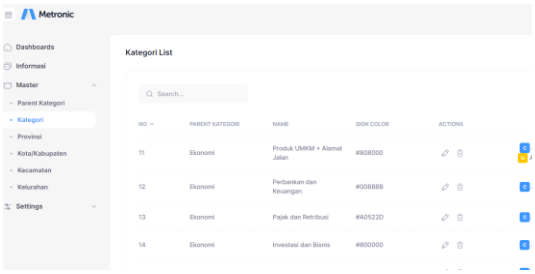

Figure 11. Category management – related to information or input, regarding the economy

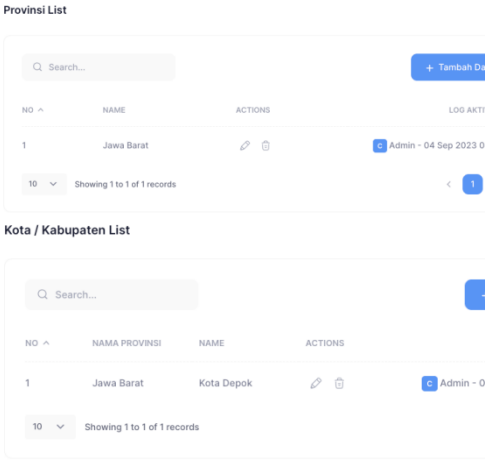

Figure 12. Provincial and City Master Data (Depok)

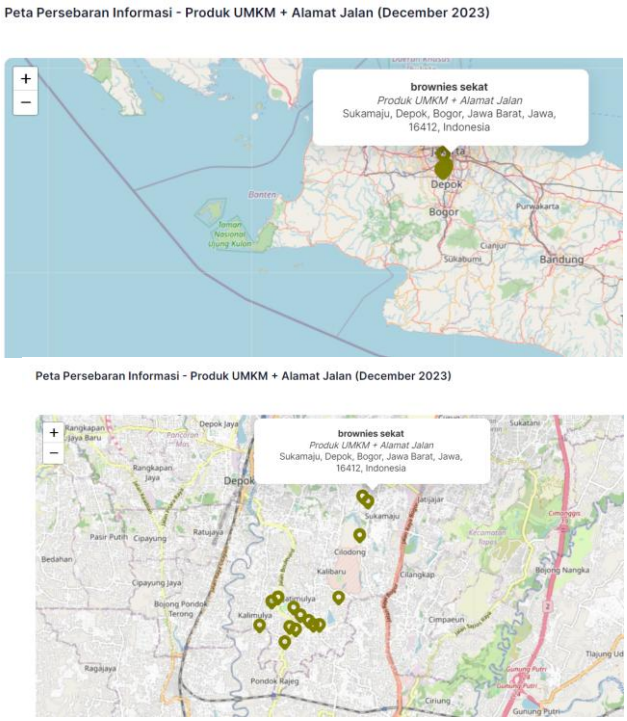

Figure 13. Distribution of information based on spatially based categories

Trend Analysis of Word Count Graph Information

In addition to information management, text data processing from information data is also carried out (Lau et al., 2019). This process uses the concept of text mining, which is to extract information by processing text data into word units that can be carried out in the next process, including calculating word frequency.

The algorithm in this process is to process a set of text data by tokenizing, removing stopwords, and punctuation marks and other characters that are not needed referring to the Indonesian Language library. After that, the number of

words that appear is calculated and sorted starting from the highest number, and plotted on the word graph against the number (word frequency).

In this case, the trend of information data that exists in a certain time range is obtained, for example the word count trend graph in figure 14. From the graph, information trends regarding training and data on MSME products were obtained from the data on the "Depok Cerdas" application.

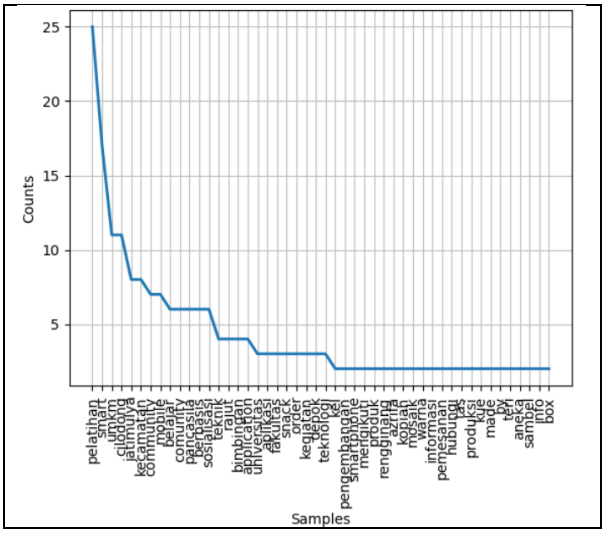

Figure 14 Distribution of information based on spatially based categories

Black Box Testing

To validate the running of the Smart Community application/system, a Black Box test (table 3) was carried out consisting of 18 test cases on the client side (mobile) and Server side (web). The result of the test is that 100% of the test cases are compliant.

Table 3. Black Box Test Cases

It	Test Cases	Expected Results	Test Results
Mobile (Client Side)			
1	Citizen registration	Citizen data is stored in the database	Appropriate
2	Log in as a citizen	Residents can enter the home menu	Appropriate
3	Capture photos at the location to be informed	Photos captured	Appropriate
4	Title and Description Input	Text data can be input	Appropriate
5	Choose a category to input	Categories can be selected	Appropriate
6	Process of Submitting Information	Information sent and in the database	Appropriate
7	View Sent Data in Profile	Display information on the amount of information in the profile, and display of the data sent	Appropriate

It	Test Cases	Expected Results	Test Results
8	View data List “terkini”	Show all the list of information along with photos	Appropriate
9	View Nearby Info	Display a list of information along with photos for the closest distance to the residents. (location of the community in Sukmajaya district, back down information data in Cilodong district)	Appropriate
10	View details Information 1 information along with photos and points on the map	Displays 1 piece of information along with photos and points on the map	Appropriate
Web (Server Side)			
11	Login as an admin / stakeholder	A dashboard display appears	Appropriate
12	Displays information recaps and data distribution maps	Information and data distribution map are displayed	Appropriate
13	Displays the distribution of data on the map per category	Category titles and data distribution on the map per category are displayed	Appropriate
14	Displays information pop-ups at a single point of the map	Pop up data at one point is displayed	Appropriate
15	Displays a list of data information stored in the master table	The information data stored in the master table is displayed	Appropriate
16	Displays the details of a single piece of information along with the location point on the map	Information along with location points on the map are displayed	Appropriate
17	Sending a message on a single piece of information from a citizen	Messages are sent, and can be seen on the side of citizens who have information	Appropriate
18	Comment from a message	Comments from messages can be displayed	Appropriate

In general, analysis and design of systems related to the economy to build a smart community have been carried out, as well as the development of spatial-based applications for two sides, namely the client side for mobile users, where users are citizens (figure 6). On the other hand, there is a server-side for users who access the

web, where users are admins and stakeholders such as local leaders (Park et al., 2019; Qudaih & Mitani, 2011).

The client-side process begins by accessing the "Depok Cerdas" application through the playstore and registering as a citizen (figure 6). The process that can be carried out is the exchange of information between citizens, in this case related to the economy, which. These exchanges can be adjusted to categories including MSME products and locations, banking and finance, job markets, job seekers, training information, exhibitions, and other options (figure 9a). Residents can share information in the form of real-time photos along with information description text at the location where the resident is when entering information (figure 7). In addition, there can be interaction between residents, where residents can send messages on one shared information and other residents can respond (figure 8). For data collection, socialization has been carried out for MSME actors – related to the economy in the Kalimulya and Cilodong sub-districts, so that various products from MSME actors are distributed (figure 7) and can be sent messages and commented on (figure 8). In general, because it is location-based, from where residents access the application, all information that is closest to the access location can be displayed (figure 9b), with the aim of making it easier to reach the location if follow-up is needed, such as product orders, job vacancies. Economically, this application can help online marketing from existing business people, in this case at the MSME level.

The server-side process begins with accessing the application via the web as a stakeholder, which can monitor the contents of all information in various categories along with spatial attributes and related photos (figures 11a and 11b). In addition, category management (figure 11), spatial area management for the developed smart community, in this case the Depok area, West Java (figure 12) can be carried out. Access to the distribution of information for certain categories or classifications can be seen on the map and certain information points can be accessed in detail (figure 13). The monitored information can help stakeholders to take action if needed to help if there is a problem conveyed in the information or support a positive information so that the impact can be more widespread.

The results of this research are the beginning of the development of Smart Communities in the Depok area, especially Cilodong District and Sukamulya-Cilodong Village, following the concept that Smart community is a combination of technology – ICT, in this case the use of the internet, mobile and web technology, people – in terms of communication, innovation – in terms of application development for the Depok region community in the economy (Gunardi et al., 2015). In addition, in accordance with the concept of smart community based on mobile internet, and the concept of Small smart community where the difference is that in addition to IoT technology, mobile internet is used (Sukmatama et al., 2019).

The advantage of this study is that it uses a spatial basis in the information that is shared and monitored, so that the location of information between residents can be known at a distance, where is the closest location (Gao et al., 2016). In addition, interactive communication can be carried out between residents, and residents can access every information from every other citizen, not just accessed

by stakeholders, so that it can create a bottom-up communication flow. Another feature is that text information can be monitored, according to the words and sentences described by residents, so that more detailed information trends related to things shared by residents can be known (figure 14). This similar research until the time of publication has not been discussed, so this research can be used as part of the reference if there is a development of smart communities in other areas of West Java in particular, and Indonesia in general. From testing the application using the black box method (table 3), the results of the test cases were obtained that were all appropriate (Asteria, 2016).

The disadvantage of this study is that the feature for trend information in the graph is still carried out separately, not automatically combined in one application. In addition, automatic classification has not been carried out, still using predetermined categories (Wardoyo et al., 2019). This is because there is still a need for more comprehensive economic data, including other sub-districts in Depok City, as well as other variables such as the level of economic development, or GDP, unemployment rate, which can still be further researched.

The challenge of this research is to expand socialization about smart communities to other sub-districts in the city of Depok, where in addition to existing residents, also to stakeholders. This is to form a smart community related to the economy in the city of Depok where people are economically comfortable in the area where they live.

CONCLUSION

From the concept of Smart Community for the area in the city of Depok, an application has been successfully developed for two platforms, namely the mobile application "Depok Cerdas" (client side) and the web-based application / system (server side), where it was concluded that the mobile application "Depok Cerdas" is a potentially effective media for residents to use, especially in the case study of the Depok area in realizing a smart community. This can be done by sharing information related to the economy, supporting each other and transacting with each other, helping people in the community to get jobs at the local level, getting information on business training or product exhibitions, as well as information on the distribution of MSMEs in the nearest location for labor market opportunities, helping MSME business people get local labor based on location and helping MSME business people do marketing online for the surrounding community.

The second platform, namely web-based and spatial-based applications / systems, can assist stakeholders in monitoring in accelerating decision-making in handling citizens' economic problems. This can be done by looking at the mapping of the distribution of business people's areas, monitoring the exchange of economic information in particular, between citizens, so that they can provide support and can see information trends in the graph.

Future research is the development of more specific data analysis features for the benefit of the economy and citizens' welfare based on Artificial Intelligence. This feature can also be used by the executive and legislative as stakeholders.

REFERENCES

Annisah, A. (2018). Usulan Perencanaan Smart City: Smart Governance Pemerintah Daerah Kabupaten Mukomuko. *Masyarakat Telematika Dan Informasi: Jurnal Penelitian Teknologi Informasi Dan Komunikasi*, *8*(1), 59–80.

Asteria, D. (2016). Bank sampah sebagai alternatif strategi pengelolaan sampah berbasis masyarakat di Tasikmalaya. *Jurnal Manusia Dan Lingkungan*, *23*(1), 129–135.

Firdaus, A. F., & Firdaus, W. I. (2021). Text Mining Dan Pola Algoritma Dalam Penyelesaian Masalah Informasi:(Sebuah Ulasan). *JUPITER (Jurnal Penelitian Ilmu Dan Teknologi Komputer)*, *13*(1), 66–78.

Gao, W., Fan, L., Ushifusa, Y., Gu, Q., & Ren, J. (2016). Possibility and challenge of smart community in Japan. *Procedia-Social and Behavioral Sciences*, *216*, 109–118.

Gunardi, Y., Adriansyah, A., & Anindhito, T. (2015). Small smart community: An application of internet of things. *ARPN Journal of Engineering and Applied Sciences*, *10*(15), 6341–6347.

Hidayat, R. (2018). Analisis Hasil Belajar Efektif Dari Penerapan Smart Learning. *Jurnal Sistem Cerdas*, *1*(1), 33–40.

Lau, B. P. L., Marakkalage, S. H., Zhou, Y., Hassan, N. U., Yuen, C., Zhang, M., & Tan, U.-X. (2019). A survey of data fusion in smart city applications. *Information Fusion*, *52*, 357–374.

Lindskog, H. (2004). Smart communities initiatives. *Proceedings of the 3rd ISOneWorld Conference*, *16*(1), 14–16.

Mohapatra, B. N., & Panda, P. P. (2019). Machine learning applications to smart city. *ACCENTS Transactions on Image Processing and Computer Vision*, *5*(14), 1.

Negara, J. G. P., & Emmanuel, A. W. R. (2019). A conceptual smart city framework for future industrial city in Indonesia. *(IJACSA) International Journal of Advanced Computer Science and Applications*, *10*(7), 453–457.

Park, J., Salim, M. M., Jo, J. H., Sicato, J. C. S., Rathore, S., & Park, J. H. (2019). CIoT-Net: a scalable cognitive IoT based smart city network architecture. *Human-Centric Computing and Information Sciences*, *9*, 1–20.

Pradono, Y. Y. (2020). *Analisis Kesiapan Pemerintah Kota Depok Dalam Implementasi Smart City di Kota Depok*. Universitas Brawijaya.

Qudaih, Y. S., & Mitani, Y. (2011). Power distribution system planning for smart grid applications using ANN. *Energy Procedia*, *12*, 3–9.

Samih, H. (2019). Smart cities and internet of things. *Journal of Information Technology Case and Application Research*, *21*(1), 3–12.

Souza, J. T. de, Francisco, A. C. de, Piekarski, C. M., & Prado, G. F. do. (2019). Data mining and machine learning to promote smart cities: A systematic review from 2000 to 2018. *Sustainability*, *11*(4), 1077.

Sukmatama, W. P., Ashadi, A., & Prayogi, L. (2019). Penerapan konsep smart city pada desain kawasan di cibubur. *PURWARUPA Jurnal Arsitektur*, *3*(1), 1–6.

Wardoyo, J., Hudallah, N., & Utomo, A. B. (2019). Smart Home Security System Berbasis Mikrokontroler. *Simetris: Jurnal Teknik Mesin, Elektro Dan Ilmu*

Komputer, *10*(1), 367–374.
Widodo, N. (2016). Pengembangan e-Government di Pemerintahan Daerah Dalam Rangka Mewujudkan Smart City (Studi di Pemerintah Daerah Kota Malang). *Jurnal Ilmiah Administrasi Publik Universitas Brawijaya*, *2*(4), 81289.