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Iriana Bakti

iriana.bakti@unpad.ac.id

Feliza Zubair

Universitas Padjadjaran, felizaherison@yahoo.co.id

Yustikasari Yustikasari

Universitas Padjadjaran, yustikasari39@gmail.com

Priyo Subekti

Universitas Padjadjaran, priyo.subekti@unpad.ac.id

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# ANDROID-BASED WASTE MANAGEMENT INFORMATION SYSTEM

Iriana Bakti<sup>1</sup>, Feliza Zubair<sup>2</sup>, Yustikasari<sup>3</sup>, Priyo Subekti<sup>4</sup>

<sup>1,2,3,4</sup>Universitas Padjadjaran

[iriana.bakti@unpad.ac.id](mailto:iriana.bakti@unpad.ac.id)<sup>1</sup>, [felizaherison@yahoo.co.id](mailto:felizaherison@yahoo.co.id)<sup>2</sup>, [yustikasari39@gmail.com](mailto:yustikasari39@gmail.com)<sup>3</sup>,  
[priyo.subekti@unpad.ac.id](mailto:priyo.subekti@unpad.ac.id)<sup>4</sup>

**Abstract.** The garbage bank is one of the institutions that play a role in managing household waste to be more beneficial for environmental, health, and economy. For this reason, there is a need for capable management system enables to facilitate the community in the collection, withdrawal, and transactions of the garbage. The organizer of the Dahlia Garbage Bank in Margahurip Village, Banjaran District, Bandung Regency, is trying to offer a Waste-Generating Information System (SISAPU) through socialization to the community as a solution to the waste management. This study aims to explore the reasons for SISAPU socialization, the SISAPU socialization process, and SISAPU socialization objectives. The method used in this research is descriptive with data collection techniques using observation and in-depth interviews. The informants are the organizer of the waste bank, and housewives, and members of the youth group. The results of this research show that the reason for SISAPU's socialization is that it is easy to use and accelerates the process of collecting waste, and is also able to generate money or exchange it with cellular pulses/electricity tokens, or hydroponic vegetables. The SISAPU socialization process was carried out interpersonally at the time of garbage collection and profit-sharing, or in groups at the village forum meetings. The purpose of SISAPU Socialization is to increase knowledge, equalize perception, and build participation by using android-based waste management.

Keywords: socialization, SISAPU, knowledge, perception, participation

## Introduction

Garbage is one of the environmental issues that become a priority to be addressed by the regional government. Garbage disturbs the beauty of the environment and also its health. In which able to disturb the reputation of the area concerned. According to the Head of the Environmental Office of Bandung Regency, Bandung Regency, with a population of 3,6 million people, would produce the amount of garbage of 1440 kg per day, equal to 1 resident producing 0.4 kg of waste per day (Zein, 2019). The garbage problem is, of course, also experienced in Banjaran District, one of the districts in Bandung Regency. The problem faced by the district is that the available landfills are not adequate compared to the production volume of waste. As a result, the accumulated garbage has caused a foul odor.

Various attempts have been made, both conventional and unconventional, such as dumping garbage into landfills and by managing waste into something that has economic value. Waste management with economic value is an innovation made by the organizer to make waste more valuable so that it can benefit the community.

Waste management that has economic value requires community understanding and participation because they are the ones who produce waste, and they have to treat waste disposal as it should be. In building community understanding and participation, mindset

change should be the one to focus on, and one of them is by treating rubbish as economically valuable waste.

Changing the mindset and patterns of action of the community in handling waste is not easy. They must be informed in advance about the procedures for managing waste, one of which is through socialization on social media by using Android-based applications on smartphones owned by the community. Social media can persuade followers (Hamzah et al., 2013), while smartphones can be used to study the development of various knowledge and innovation as a source of knowledge (Boham & Rondonuwu, 2017).

The results show that the higher the intensity of accessing social media accounts, the higher the behavior change that occurred (Rizki & Lubis, 2014). Therefore, as a system that exists on smartphone media, Android-application is the system used to provide information and guide users in managing household waste in their area.

Android-application is used a platform as it would be able to help users to get information on the types of waste that can be used as an economic resource, the location of waste collection, garbage pickup services, waste savings. Therefore, using an Android-based application provided a solution as it is used in mobile media, where organizers can widely spread their applications to the public (Ependi & Sopiaha, 2015).

Dahlia Garbage Bank in Margahurip Village, Banjaran District, Bandung Regency, created an Android-based waste management system named the Money Generating Waste Information System (SISAPU). The applications take advantage of the fact that almost all villagers have a smartphone to interact, as well as to share information relating to waste issues. Thus, this Android application can be used as a solution for managing online waste bank transactions (Marali, Pradana, & Priyambadha, 2018).

SISAPU, as an information system, can collect information from various sources and display the information again to meet the needs of daily waste transaction processing, storage, collection and processing of waste, and to help provide reports that are needed by Margahurip villagers.

According to Nash (F Nash, 2003), an information system is a combination of human, technological facilities or tools, media, procedures, and controls aimed at managing major communication networks, specific transaction processes and routines, helping management and internal and external users, and providing a basis for the right decision.

The purpose of the Dahlia Garbage Bank organizer to disseminate the development of this system is to facilitate villagers in obtaining information on household waste management to become a source of money. They were informed on how to click the SISAPU application to collect and measure waste, and the amount of money that can be obtained by using the application.

The use of SISAPU aims not only to change villagers' perceptions about the use of smartphone media, but also to educate them to understand, assess, and treat waste as a source of economic support for citizens. In the application, residents are given access to find out how much money is obtained from garbage purchased by the garbage Bank, or when residents would be able to borrow money from the Garbage Bank to face the Eid, new school year, holidays, and compensation.

All information relating to waste management has valid data, which increasing trust from citizens to be ready to participate in the management of the Android-based SISAPU. With

the use of the android system in waste management, it is easy for the public to inform the garbage collection to officers (Bahri, Suhada, & Hudin, 2019), facilitate officers to monitor waste collection (Faisal, 2017), and optimize the performance of the garbage bank (Pratama et al., 2018). This SISAPU is an implementation of entrepreneurship carried out by the Dahlia Garbage Bank as one of the solutions in overcoming the waste problem in the village. Dahlia Garbage Bank conducts socialization in advance to the community, both individually and at the time of garbage collection, and the distribution of income, and as a group at village meetings.

SISAPU itself is an innovation disseminated by the garbage bank organizer to the community by utilizing interpersonal and group channels. Socialization is a communication activity that aims to build knowledge, equating perceptions as a provision for himself in making community decisions to participate in applying the Android-based waste management system in Margahurip village, Banjaran District, Bandung Regency.

This study aims to explore the reasons for the socialization of the use of the android based application of the waste management system, the process of implementing the socialization, and the purpose of socializing.

## **Research methods**

This study uses descriptive research methods. Best (1970) described it, "Descriptive Research describes and interprets what is. It is concerned with the conditions of relationships that exist; practices that prevail; beliefs; processes that are going on; effects that are being felt; or trends that are developing" (Best, 1970).

The study is focusing on interpersonal and group communication activities by community garbage bank organizers concerning efforts to introduce an android-based waste management information system

Data collection techniques using in-depth interviews with seven informants consisting of garbage bank organizers, housewives, and members of the youth exposed to information about the use of the android system in waste management. The technique of determining informants is by purposive sampling.

## **Results and Discussion**

The Dahlia Garbage Bank is located in Margahurip Village, Banjaran District, Bandung Regency. This garbage bank is managed by the local Youth Organization, which is directly created by the Village government, District government, and Bandung Regency Health Offices. According to the head of the Dahlia Garbage Bank, Hadi Hidayat, the Dahlia Garbage Bank was established as "Efforts to maximize the value of waste by raising public awareness, which will create a more healthy, clean, green, and beautiful environment. Also, the waste bank aims to reduce the amount of waste to landfill and provide benefits to the waste producer involving creativity".

The use of an android-based waste management system by the Dahlia Garbage Bank in Margahurip Village, Banjaran District, Bandung Regency, SISAPU, is an innovation carried out by the waste bank organizer by utilizing social media to build understanding and participation, and facilitate the community. in managing waste that can make money. Social

media is used because it can fulfill one's cognitive, affective, personal, and social needs (Prihatiningsih, 2017). This need is an essential factor that must be present in a person in developing his attitude and behavior towards the waste problem in his area. The proper use of social media has the potential to increase the interest of its users, especially to persuade and establish emotional closeness in order to increase the followers' trust in the information provided (Hamzah et al., 2013).

The user interface of android based application SISAPU is as followed:

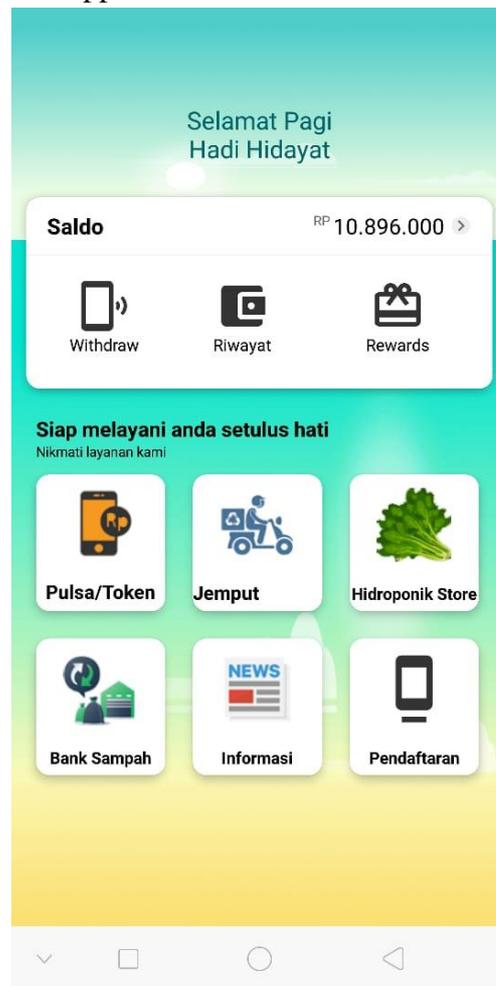


Figure 1. Android based application of SISAPU

Based on Figure 1 above, the credit/token functions to exchange the balance with an electricity token. Pick up is used when garbage in the house has piled up and is ready to be picked up by the officer, the Hydroponics store is used to exchange the balance with hydroponic vegetables provided in collaboration with KWT (farmer women's group) to provide education that waste can also provide nutritional intake in a sign and types of waste that can be cashed in. Information is used to inform customers if there are other activities and information regarding technical applications. Registration for customers of this application can register themselves or their neighbors to join the waste bank.

This SISAPU apps emphasizes on household waste in Margahurip Village, Banjaran District, Bandung Regency. With this system, it is hoped that the community will have more

discipline in handling waste at their homes. At the same time, the community is urged to accustomed to using the smartphone more effectively not only as a means of communication, which is socially valuable, but also economically valuable. The public can send the status of their trash bin through their Android smartphone straight to Garbage Bank organizer, enabling them to monitor the trash condition, and the problem of waste can be handled optimally (Faisal, 2017). The implementation of this system enables the entrepreneurial climate in how to manage waste.

Based on the results of interviews with informants, the reason for using the Android-based application SISAPU is that the system can simplify and speed up the process of managing household waste, which could be a source of money for the community and reducing the load for the trash bin.

SISAPU is a system that needs plan and design based on an analysis of the needs of the community as users. For this reason, before the implementation of system planning, this online-based application system must first identify all user needs (Marali et al., 2018).

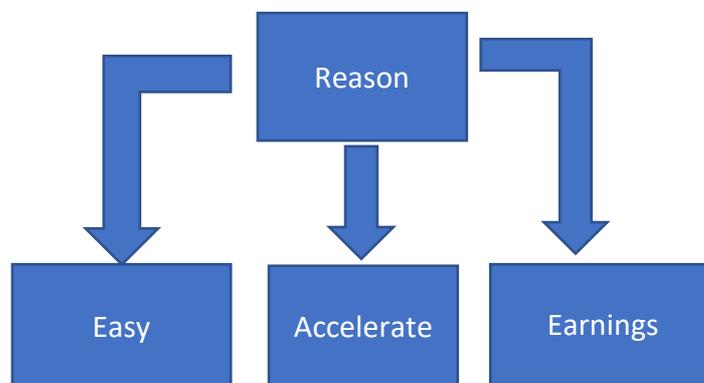


Figure 2. Reason of SISAPU socialization

SISAPU can facilitate the public in reporting on the point where garbage is collected, which is not known by the garbage collector beforehand so that the garbage transporter can easily find the pick-up point of the garbage. With the location and waste collection tagging, it is expected that there is active communication between the community and the waste collection staff so that the pile of garbage at points that were previously difficult to reach can be handled more quickly (Bahri et al., 2019). Communication by utilizing this application can improve the optimization of the performance of the garbage bank because the volume of waste deposited by the public, in the long run, can be reduced (Pratama et al., 2018).

SISAPU is easy to develop, and the data presented are complete, current, and in line with community needs. With this system, people can quickly obtain information relating to exchanging balances with electricity tokens or mobile pulse vouchers, picking up trash, exchanging balances with hydroponic vegetables, and other information. Therefore, the development of web-based information systems enables data management effectively and efficiently so that it can provide the latest information to the public quickly and easily (Mertayasa & Yambese, 2017). Also, this system facilitates interaction between organizers and application users (Rizki & Lubis, 2014).

Another advantage of SISAPU is that information about management needed by the user can be immediately obtained and responded by the user at the same time, establishing

reciprocal communication between the system organizer and the user. Thus, the media able to provide various information for users regularly and to accommodate their feedback quickly so that it has the potential to become a mass communication that has broader reach (Budiarjo, 2017). Besides, this android-based information system can help users to get information that suits their needs quickly and efficiently (Gunawan, Kurniawan, & Saputro, 2017)

Utilization of SISAPU, other than providing the information required by users, is also a system that can help users to obtain the results of household waste collected and deposited to the Dahlia Garbage Bank. The system allows users to do transactions by exchanging balances from garbage deposits in the waste bank with mobile phone pulse vouchers, electricity tokens, and hydroponic vegetables, with the amount of balance they have. Communities can recycle organic and inorganic waste to reduce environmental pollution and to increase income (Aryenti, 2012). Thus, the waste bank management process can produce positive impacts on the environment, plus having relationships and social networks that have economic value (Suryani, 2014).

Dahlia Garbage Bank's efforts in helping the community's economy include lending money from the sale of the waste for business capital, sending children to school. Thus, a waste bank is an institution where to collect and manage waste, where citizens can save waste that can make money (Marali et al., 2018).

The process of socializing SISAPU carried out by the organizer of the Dahlia waste bank to the community at the time of garbage collection, profit sharing, and village meeting. Socialization is important because it must be understood, agreed, and implemented by those concerned and involved. Socialization can build knowledge, creating insight, and shape public awareness (Maulina, 2012).

Socialization is an act of communication to build a common perception of the android-based application of waste management that is beneficial not only from environmental aspects but also in economic aspects. As an act of communication, some communicators are responsible for disseminating information, messages in the form of narratives or images, applications were chosen to share, and communicating as recipients of information (Wenday Dwi Novi Kurniawati, 2016). In this socialization, the communicator is the head of the Dahlia waste bank, the message or information is SISAPU, the application chosen is android, and the communicant is the community of Margahurip village, Banjaran District, Bandung Regency.

Margahurip village community is targeted for SISAPU socialization because, so far, the community is very concerned about environmental preservation, even the Dahlia Garbage Bank is doing well so that it becomes a pilot project for garbage bank. Socialization does not place the community as a target, but they instead positioned as beneficiaries who must be served and facilitated as partners (Zulkarnain, 1<sup>□</sup>, Diah, & Purwani, 2018). The SISAPU socialization process is carried out individually at the residents' homes at the time of waste collection, and the distribution of results, while in groups, it is carried out when there are village meetings.

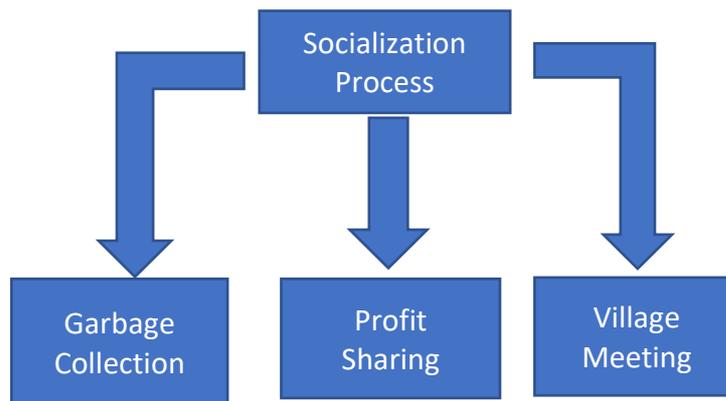


Figure 3. SISAPU Socialization process

The SISAPU socialization at the time of garbage collection and the distribution of profit, took place face-to-face, door to door, where the garbage bin officers came to the residents' houses to collect the garbage. The waste collection technique used by the community is only limited to the collection of rubbish, not yet on waste segregation, so the waste collection system used is an individual pattern (Praditya, 2012). In this socialization, the officer explained in detail the android-based application waste management system starting from how to exchange mobile pulse voucher/electricity token, exchange hydroponic vegetables, how-to pick-up garbage, profiles and principal tasks and functions of the garbage bank, how to find other information needed, and how to register the required information. All of these are communicated and discussed interpersonally through dialogue to achieve equality, agreement, and cooperation between garbage bank organizers and the community.

Interpersonal communication that occurs between garbage bank officials and the public when collecting the garbage and profit-sharing take place is dialogic, so that between the two parties can exchange ideas about the android-based application waste information system. Interpersonal communication facilitates behavior change in the form of participation because each individual can share information directly (Suharsono, 2012). Therefore, interpersonal communication by prioritizing dialogue in SISAPU socialization can be effective because it is between the two parties who had an agreement to use the system. Effective communication can contribute to building trust and cooperative relationships between the two parties (Noor Ariyani Rokhmah, 2017).

The SISAPU socialization was then carried out at the official forum of the village meeting, which held routinely once a month. In this forum, the organizer of the Dahlia Garbage Bank conveys information on the utilization of this system. Meeting participants consist of the Head of the village, the Chair of the RW, the Chair of the PKK, the Chair of the RT, and other community members. In the forum, the garbage bank organizer introduced the reasons, functions, benefits, and application, as well as obtaining profit from the use of the android-based application of the waste management system. Delivering information in this group becomes essential because there are some activities conducted, including discussion, learning together about technology, and a forum for making decisions together in adopting an innovation (Adawiyah, 2017).

The communication forum at the village meetings, focusing on the discussion of the SISAPU implementation plan, has become necessary for waste bank organizers because the operations require formal legality from the local government. In the forum, a process of brainstorming, and consideration took place, all of which can strengthen formal legality, and accelerate the operation of the android-based application of the waste management system. Therefore, through the Communication forum, the process of conveying information can be conveyed quickly and better because communication takes place in two directions (Ardanisatya & Handiwidjojo, 2014).

SISAPU's socialization in Margahurip village shows the seriousness of the Dahlia Garbage Bank organizer in carrying out his duties as a dialogic communicator in conveying information on an innovation about the android-based waste management system conveyed from his investigation, ideas then delivered to the community as a solution that needs to be overcome together with all parties involved participating.

The socialization plan for implementing SISAPU is an informal education process, as there is a process of delivering information about an innovative system that is communicated and discussed to participants who attend the village meeting forum to build common perceptions, agreements, and hopes about solutions for household waste management in the area. The process of communication is excellent as expected, and the discussion can build understanding, agreement, and unity in opinion, so that the educational process is successful (Mustakim, Rahamma, & Muhammad, 2013).

SISAPU socialization conducted by the management of the Dahlia Garbage Bank is an innovation to build knowledge, perceptions, and the willingness of the community to use an Android-based application of the waste management system. This innovation in household waste management is an effort to empower people independently who can provide positive value to the community through the use of public spaces from household waste to be of high value (Hayat & Zayadi, 2018). The community is important as a producer of household waste, which also must be responsible for managing the waste it produces. For this reason, SISAPU's socialization would increase the ability of the community to communicate through smartphones, so that they would be able to use it wisely in managing waste in their area.

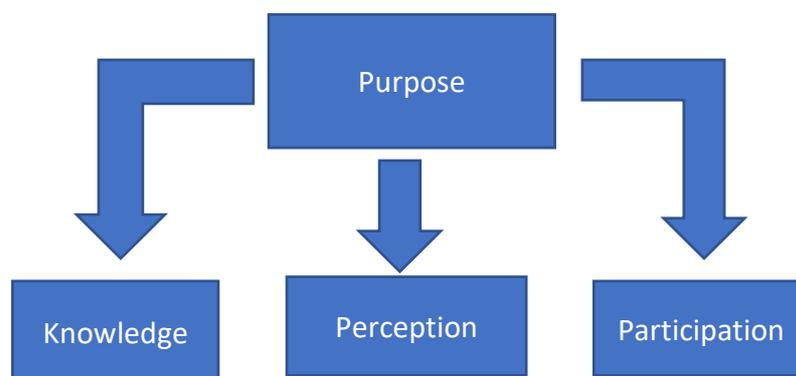


Figure 4. Purpose of SISAPU socialization

Margahurip villagers in Banjaran district, Bandung Regency, need SISAPU socialization to optimize their smartphone from just a means of communication to the need for valuable economic transactions from the waste sector in supporting sustainable environmental conditions. For this reason, it requires a much-needed positive attitude from the community by supporting the Android-based application of waste management. Environmental awareness is influenced by a positive attitude towards the environment itself, reducing environmental damage, and a sustainable environment can be actualized (Palupi & Sawitri, 2017).

Forming a positive attitude of the community could be done through socialization in the form of knowledge, positive perceptions, and participation to utilize SISAPU as one of the waste management solutions in the region. Through socialization, community knowledge can be built, the perception will be formed, and actions to manage household waste will be carried out with other residents (Mailoa et al., 2017). Research by (Lestari & Subhi, 2018) shows that good knowledge influences people's behavior in household waste management.

SISAPU socialization is a learning process to build knowledge and increase community experience in an Android-based application waste management system. Based on this knowledge and experience, there will be interpretations of information from the public as they went through all the socializations. The organizer of the Dahlia Garbage Bank, carrying out the socialization, has tried to build a positive public perception about the use of the system to be a solution in managing waste in his village. A positive perception of the garbage bank system will lead to public participation in the success of the program that will be implemented by the garbage bank (E

The final goal of SISAPU's socialization in Margahurip village is to invite the community to participate in utilizing the Android-based application of the waste management system. It is an important thing to do as willingness is a driving force for someone to take useful action for any individual. The organizer of the Dahlia Garbage Bank seeks to generate community participation by explaining the purpose and benefits of SISAPU as an economic waste management system. Direct or indirect community participation is a very important capital in managing household waste in the area (Nugraha, Sutjahjo, & Amin, 2018).

SISAPU's socialization by the organizer of Dahlia's Garbage Bank tried to explain in awaken the emotional aspects of the community, about other aspects of the purpose and function of its smartphone. To use it more creatively and productively rather than just communication and entertainment tools only, but also as tools to find information and conduct transactions of economic value through the existing android-based application system in it. Therefore, smartphones become appropriate tools to keep abreast of information and study innovation in building knowledge (Boham & Rondonuwu, 2017).

The socialization function is to explain the process carried out in order to create standard activities, facilitate transparency, and decision making so that each activity is conceptualized clearly (Galih Kartika Barata, Puji Lestari, 2017). With this socialization, there will eventually be a shared perception among garbage bank organizers, community, and local government officials as stakeholders, which in turn will also build participation to utilize the android-based application waste management system.

Participation in utilizing SISAPU needs to be increased because it is a joint effort of waste management innovation program, to achieve a common goal in overcoming the problem of household waste so that the impact is not only on the health and beauty of the environment

but also on the economic problems of the family. Participation in the management of household waste through SISAPU in the village of Margahurip is in the form of making decisions to implement and use the system.

Socialization participants shared the same perception that SISAPU is the system needed to manage household waste in the region and decided to implement the system under the responsibility of the management of the Dahlia Garbage Bank. Innovations that are perceived by adopters that correspond to their needs have an actual link with their decision-making output (Ulfah, 2017). The decision-making process for adopting SISAPU as one of the solutions in managing household waste in Margahurip village did not just emerge but began with an introduction process in the form of individual socialization at the time of garbage collection and profit-sharing, as well as in groups at village meeting forums. Thus, the state-of-the-art system supports the organizers to produce speedy and accurate information in the process of making effective decisions (Dwitrayani, Widanaputra, & Putri, 2017).

Communities demography who decided to accept SISAPU is generally under thirty years old housewives and teenagers who are members of the youth group. The reason for receiving SISAPU is because they were able to operate the application, and it is how they able to easily manage their household waste. Older people tend to approve the system, but do not utilize it as they lack technological knowledge, and they found the application is complicated. Thus, the factors that cause acceptance of innovation are openness to new things that can bring benefits, while those who are reluctant to accept innovation because they are satisfied with the status quo, lack of strong desire to develop themselves, less creative, and consider the costs expensive (Fatonah, Afifi, Ilmu, Fisip, & No, 2008). Thus, the process of adoption of these innovations is ultimately related to social dimensions relating to age groups and gender and social support capacity in the form of the habit of using technology (Adianto, Muhadjir Darwin, 2018). In the end, the decision-making process to implement SISAPU tends to be individual or personal.

## **Conclusion**

SISAPU is a system developed in an android based application by the Dahlia Garbage Bank in Margahurip Village, Banjaran District, Bandung Regency, as a solution for household waste management. This system can be used by the community as a medium to share information, rubbish collection, and making transactions from the sale of waste, which money stored in garbage bank.

SISAPU is easily able to inform the presence of garbage, collected in the community, accelerate the withdrawal of waste by officers from the garbage bank, and able to generate money that can be exchanged for mobile phone pulse vouchers/electricity tokens, and hydroponic vegetables. Thus, the waste management process can produce a positive impact on the environment, to have social relationships, and networks that have economic value.

In order to build positive perceptions about SISAPU, the organizer of the Dahlia Garbage Bank, conducts its interpersonal socialization during waste collection, and profit-sharing, and in groups at village meeting forum, where the informed public is positioned as beneficiaries to be served and facilitated as partners rather than a target, this would contribute in building trust and cooperative relationships between the two parties.

Through SISAPU socialization, community knowledge can be increased; positive perceptions will be formed so that it can influence joint actions in managing household waste with economic value. Directly or indirectly, community participation is a very important capital in managing household waste in the village of Margahurip.

SISAPU, as a household waste management in Margahurip village, has fulfilled one of the characteristics of innovation, namely, the relative benefits perceived by the community, a more natural way for users to have an economic value with waste transactions, and have more advantages compared to conventional waste management.

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