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Mobile Apps Business Design and Development for Integrated Waste Management

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Abstract*: The conditions in Indonesia are specifically described in the research results of Jenna R Jambeck and friends [1] stated that Indonesia was in second place contributing plastic waste to the sea after China, followed by the Philippines, Vietnam and Sri Lanka. Waste Bank is local wisdom initiative from Indonesia for the waste management. Waste banks are established in a special environment for around 1,000 residents and are usually managed by people and targeted to people who want to increase their income. Bank customers bring all non-organic waste to banks that are treated as deposits. Transactions are recorded preferably in the bank book that the customer keeps or alternates in the list stored by the bank. Many banks also accept organic waste while the rest support composting at home. Waste banks sell materials stored to agents or ultimately to waste bank central developed by government and supplied to company for reuse or recycling. So, waste deposits are converted into money that can be withdrawn when needed after a contribution of around 10% to 15% is reduced for bank operational costs. Community empowerment through the concept of a waste bank still needs the support of infrastructure and information technology facilities and profitable partnerships. The empowerment program for the citizens were conducted through counseling, education, training with as well as dialogue with the citizens in the targeted community. The community waste bank will not have the potential to grow without the involvement and support from the stakeholders. It becomes important to develop model and implement the partnerships, networking and institutional cooperation mechanism between the community, waste bank management, institution, business and government. The integrated partnership on waste management with system information support can generate creativity and innovation as well as to improve the welfare of the community. This paper discuss about designing mobile apps business development for integrated waste management system. It's a proposed design model for apps and business model for waste management in Indonesia and other developing country.

***Keywords*: Case Study, Integrated Waste Management, Information System, Local Wisdom, Waste Bank.**

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I. INTRODUCTION

According to WHO waste is something that is not used, not liked or something thrown out from human activities and does not occur automatically [2]. Based on a report from the UN Agency on Waste Management in ASEAN Countries in 2017, urban solid waste (Municipal Solid Waste / MSW) per capita in ASEAN is 1.14 kg / capita / day. In terms of annual total MSW generation, the sequence is as follows: Indonesia produces municipal waste with an amount of 64 million tons / year, followed by Thailand (26.77 million tons / year), Vietnam (22 million tons), Philippines (14.66 million tons), Malaysia (12.84 million tons), Singapore (7.5 million tons), Myanmar (0.84 million tons), and Laos produced the lowest amount of MSW of 0.07 million tons / year. Most, organic waste (around or more than 50%) is the highest fraction of MSW in all ASEAN countries, except Singapore, where organic waste accounts for only 10.5% of the total MSW. Other waste streams such as plastic, paper and metal are also common sights in the MSW stack. In addition to MSW, waste Healthcare, E-waste, Industrial waste, and Construction and Demolition Waste are waste streams that have emerged in ASEAN countries [3].

At present most ASEAN countries have established national strategies to address challenges related to extensive waste management through the Environmental Law, and Green Growth Policy, Sustainable Development and Climate Change, regulatory frameworks and strategies. Countries such as Indonesia, Malaysia, the Philippines and Thailand have specific laws regarding waste management. From an institutional aspect, the making of waste management policies at the national level is under the jurisdiction of the Ministry of Environment, while many other ministries also have a role in regulating special waste streams (for example, the Ministry of Health, and the Ministry of Industry for health and industrial waste, respectively). Sometimes, disharmony and lack of coordination between these institutions and stakeholders (for example, overlapping responsibilities and authorities) are the main causes of waste mismanagement. At the local level, the provincial or regional government, urban local bodies, namely, the municipality is directly responsible for handling waste management services. In addition to the government sector, non-government sectors such as the private sector, NGOs and community participation have also developed as public-private partnerships in the waste management sector.

World Bank in Indonesia is currently exploring how to improve solid waste management, and increasing the development and spreading out 'waste banks' is one of the choices[4]. Government Regulation No 18 of 2008, concerning Waste Management and Regulations Government Number 81 of 2012 mandating the need for a paradigm change fundamental in waste management namely, from the paradigm of get-transport-waste becomes processing based on reduction waste.

Waste reduction activities meaningful for all levels of society, good government, business and society broadly implement restrictions activities landfill, recycling, and reuse of waste or more known as Reduce, Re-use and Recycle (3R) through smart, efficient efforts and programmed [5], [6], [7].

The conditions in Indonesia are specifically described in the research results of Jenna R Jambeck and friends [1] stated that Indonesia was in second place contributing plastic waste to the sea after China, followed by the Philippines, Vietnam and Sri Lanka. According to Research Greeneration, a non-governmental organization that has followed the waste issue for 10 years, one person in Indonesia produces an average of 700 plastic bags per year. In nature, non-biodegradable plastic bags pose a threat to life and ecosystems. The data from the research results are reinforced by the recent reality around Indonesian society. In the city of Banda Aceh, for example, there is also a lot of waste produced every day. In the capital city of Aceh, the waste produced per day reaches 200 tons.

In order to encourage environmental services that are free from waste and waste, the central government must involve several parties. According to the Director General of Human Settlements of the Ministry of Public Works and Public Housing (PUPR) Andreas Suhono, the development of a clean environment cannot be done if only from the central government, but also the regional government (PEMDA). For this reason, the Ministry of Public Works and Housing prepares the budget used to buy heavy equipment. The total accounted for 42 units with a value of IDR. 115 billion (in 2016). Furthermore, through the Presidential Regulation (Perpres) No. 97 of 2017 concerning National Policies and Strategies for Household Waste Management and Household Waste, the government apply national waste management policies and strategies (Jakstranas). Through a policy issued on October 23, 2017 the government targets to reduce waste by 30% by 2025 and can handle a pile of waste before this policy is set at 70% in 2025. Referring to data from the Ministry of Environment and Forestry (LHK), the household sector is the largest contributor to waste, which is around 48%, followed by traditional markets at 24%, and roads at 7%. In addition, local governments starting at the provincial, district and city levels are also required to make regional policies and strategies to deal with waste.

In order to anticipate the above conditions it can be concluded that waste management requires the roles of various parties to develop and participate in the implementation of: (1) Policies and Regulations, (2) Institutional, Technical and Performance, and (3) Funding / Financing / Economic Aspects of management sustainable waste - while addressing all the value chain elements of waste management (including waste, sorting, collection, transfer, maintenance and disposal, resource recovery through 3R). In this regard, community participation is the spearhead of the success of waste control and management, so efforts are needed to encourage community participation in optimizing these efforts.

II. THE IDEA OF A WASTE BANK

The idea of a Waste Bank which is essentially a place where there are service activities for waste savers or bank customer carried out by waste bank tellers. Savers or bank customer in this case are all residents, both individually and in groups, becoming members of waste savers as evidenced by the waste savings book and entitled to saving the waste. Teller is a waste bank officer who oversees serving waste savers, among others: weighing the weight of waste carried by savers, buying waste, taking notes in the master book, and communicating with collectors. Whereas collectors are individuals or institutions that are included in waste management.

Waste banks are established in a special environment for around 1,000 residents and are usually managed by people and targeted to people who want to increase their income. Bank customers bring all non-organic waste to banks that are treated as deposits. Transactions are recorded preferably in the bank book that the customer keeps or alternates in the list stored by the bank. Many banks also accept organic waste while the rest support composting at home. Waste banks sell materials stored to agents or ultimately to waste bank central developed by government and supplied to company for reuse or recycling. So, waste deposits are converted into money that can be withdrawn when needed after a contribution of around 10% to 15% is reduced for bank operational costs.

Waste bank is a system management of dry (non-organic) waste done collectively. Waste Bank acts as a dropping point for producers for products and product packaging use it over. So it becomes something which is beneficial and has economic value. According to Chandra [8] several factors are can affect the amount of waste, namely:

1. Total population, population depends on activity and density population.
2. Collection or disposal system waste used, collection waste by using more carts slow compared to trucks.
3. Taking the ingredients that are on waste to be reused, that method done because the material is still has economic value for the group certain. The frequency of retrieval is influenced by circumstances, if the price is high, waste which is left a little behind.
4. Geographical factors. Location of place disposal whether in the mountains, valley, beach, or lowland.
5. Time factor. Depends on factors daily, weekly, monthly, or yearly. The amount of waste per day varies according to time.
6. Socio-economic and cultural factors. Example, customs and standards of living and mentality society.
7. In the rainy season, waste might catch in sewers, sluice gates, or wastewater treatment.

8. Community habits. Example, if someone likes to consume one type food or plants, food waste will increase. Technological progress. As a result of progress technology, the amount of waste can increase. For example, plastic, cardboard, junk, air conditioning, TV, refrigerator, and so on.
9. Type of waste. Advanced level the culture of a society, how to do it also complex types and types of waste..

A. Pioneer of Waste Bank

The first waste bank was established in February 2008 in the village of Badegan in the Bantul area, Yogyakarta. It was claimed that it was the first bank in the entire world (Bank Sampah Bantul, 2018). Soon the number of banks began to grow exponentially. In February 2012 there were 471 banks and at the end of June 2012 there were 728 banks which generated 31.2 million Rupiah per month. According to the Ministry of Environment, Indonesia in June 2013 has 1,195 waste banks in 58 districts and cities that employed 106,000 workers. Many companies make waste banks part of their corporate social responsibility.

In 2014 the Ministry of Environment has set a target to develop waste banks in 250 cities throughout Indonesia with 25 waste banks in each city for an additional 6,250 banks. In 2014, Surabaya had more than 28 decentralized waste facilities, while the centralized bank was stopped. Tangerang (west of Jakarta with a population of around 2 million) have more than 1000 waste banks in 2014, while in the Depok area (south of Jakarta with around the same population) a total of 2,000 units of waste banks available in 2014 with the help of Shell Indonesia. TEMESI's recycling facility opens its own model waste bank in August 2014. If this rapid growth continues, Indonesia will go into the right revolution in waste management. To service 260 million Indonesians, 260,000 waste banks each serving 1,000 residents are needed. It is estimated that by the end of 2015 around 5% of the population will be served by 15,000 waste banks and nothing can stop further growth (SMASH, 2018).

Here are some interesting advantages of the Waste Bank:

1. The waste bank greatly changes the waste habits of those who are already customers:
   a. Waste becomes a source of money, shared between the waste bank and its customers
   b. Waste are collected is not just thrown away
   c. Waste is separated from the source for sale
   d. The type of waste is kept uncontaminated because this will reduce its value
2. Applying the 3 R concept model, namely, Reduce, Reuse and Recycle
3. A cleaner environment because less waste is burned or thrown into the environment
4. Compost is easier to sell in small quantities in environmental setting
5. Reduce greenhouse gas methane that else is produced in landfills
6. There is no waste sorting and expensive operational costs as found in large waste recovery facilities
7. Significantly less volume that disposed of in a landfill.

B. Problems in Waste Bank

Some of the obstacles most often faced by waste bank managers and customers are:

- The absence of an integrated information system between waste calculation transactions, conversion to prices or the amount of funds obtained and outlets or channeling funds to products that are more profitable for customers. The record of transactions in the waste bank between the manager and customers of the waste bank is still done manually in simple records.
- The price of waste that has never been stable and continues to decline, resulting in a decrease in the enthusiasm of waste bank customers to save.
- Appreciation for waste bank volunteers and administrators is still relatively low. Many volunteers are not just energy and time, but also the nature of the material to buy equipment and operational equipment must still be independent.
- There are some assistances from government or NGO in the form of equipment such as scales, biopori devices, sacks, baskets, etc. But it has not been evenly distributed and is not enough in number.
- Training support for improving skills to increase added value from waste has not been maximized, training on waste-based handicraft skills, thus providing added value to the community.

In line with these conditions, it is necessary to initiate a model of community empowerment through a Waste Bank with an Integrated Information System.

C. Community Empowerment Method

The main approach in the concept of empowerment is that society is not the object of various development projects but is the subject of its own development efforts. Based on this concept, community empowerment must follow the following approach:

First, the effort must be targeted. This is popularly called partiality. It is aimed directly at those who need it, with programs designed to solve the problem and according to their needs.

Secondly, this program must be directly included or even implemented by the target community. Including the community who will be helped has several objectives, namely so that the assistance is effective because it is in accordance with their wants and abilities and needs. In addition, it simultaneously enhances empowering the community with experience in designing, implementing, managing, and taking responsibility for efforts to improve themselves and their economy.

Third, using a group approach, because individually the poor are difficult to solve the problems they face. Also the scope of assistance becomes too broad if the handling is done individually. Because as mentioned earlier, the group approach is the most effective, and seen from the use of resources is also more efficient.

In addition, business partnerships between these groups and more advanced groups must be continuously nurtured and maintained in a manner that is profitable and advancing.

D. Model of Community Empowerment Through Integrated Information System Waste Bank

Empowerment which literally means "power / authority or authority and is concluded to be the giving or increasing power to a weak and disadvantaged society. So what is meant by community empowerment is an effort to improve the condition of the population by exploring the potential that exists in the community so that they are able to improve their standard of living by empowering them through education and training that contains motivation, awareness and strengthening so that they are empowered.

Community empowerment through the concept of a waste bank still needs the support of infrastructure and information technology facilities and profitable partnerships. Transparent partnership relationships, and integrated transactions in the waste bank between bank managers and bank customers and between three parties, namely bank managers, customers and partners are going well.

At the same time, it also enhances people's insight and increases literacy in the field of information systems and digitalization. According to Salim [9], there are several things to do to form a waste bank, namely

- Sorting waste according to its type done from the source,
- Collect dry waste sorted, e.g. glassing or plastic,
- Providing waste bank management,
- making sales schedule agreement,
- Making administrative system,
- Having collectors with a routine retrieval schedule.
- Processing waste is divided into two types, namely organic waste and inorganic waste.

E. Waste Bank Partnership

Referring to the problem of the waste bank, the support of infrastructure and information facilities and partnerships is a priority to be implemented. The waste bank partnership with other sponsor or service provider will give more benefit and motivation to the bank customer. As more partners having collaboration with waste bank, there is a need to develop an integrated information system in the form of friendly app that act as a hub to connect the customer, waste bank and sponsor or other service provider. As for the proposed model and concept of integrated empowerment between community-waste banks-partners and information systems presented in the picture as follows:

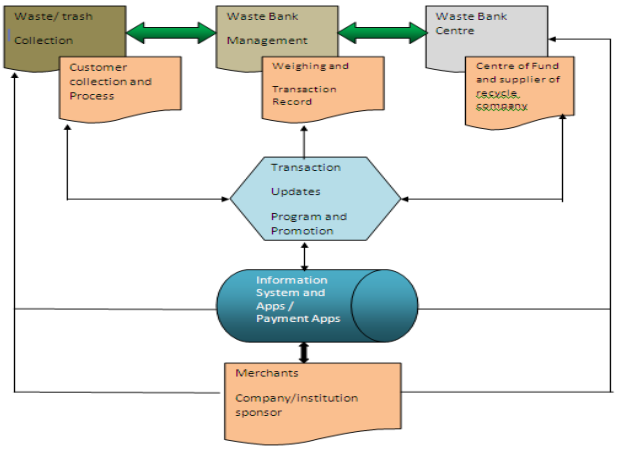


Figure 1. Model: Community-Waste Bank Management -Partner- Integrated Information System

In the picture above, it is explained that the waste originating from the customer will be deposited to the waste bank and recorded as a bank transaction. Each of this transaction must be recorded through the information system and application, which will then be converted into gold by PT Pegadaian. The recording of these transactions must always be updated through the system and can be known at any time by the customer.

The integration concept model of the pillar of empowerment in question is as follows:

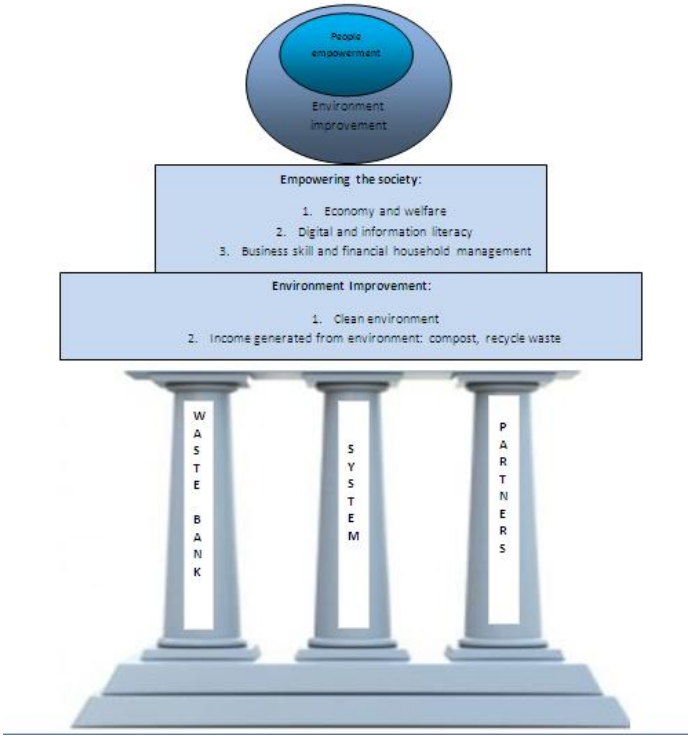


Figure 2. Concept Model of Integration of the Pillar of Empowerment: Waste Bank-Partnership-Information System

In Figure 2, it explained that the success of managing a waste bank, its system and merchants or sponsor benefits will become a pillar in community empowerment in handling waste problems

III. RESEARCH OBJECTIVES

The objective of this research is as follow:

- To provide a business model of integrated system between community, waste bank, partners and other stakeholders
- To assist bank to manage data processing and minimize errors and simplify the transaction reports every time a transaction occurs.
- To assist bank to improve the quality of service to customers and other stakeholders.

IV. METHODOLOGY

In Salim [9], the following is explained stages that have been carried out by researchers:

1. Identification of Problems, at the stage of the researcher describes the problems encountered the community.
2. Data Collection, data collection techniques what is done is as follows:
   - Field research, namely go down directly to the research location for obtain concrete data regarding issues to be discussed.
   - Observation (Observation). Research done by observing directly about non waste organic and customer data taken from waste bank Akademi Kompos.
   - Interview. Collection data is done in a way communicate directly with parties deemed capable provide information (resource persons) in detail about the problem. As for data needed to make a model that is, starting from the waste category data nonorganic, price data, customer data and data on waste bank. Dry waste (non-organic) is divided into 4 four) categories and types of waste. Following Table. 1 Category and type of dry waste"

Table- I: Category and Type Dry Waste

No	Category	Group Category
1	Plastic	Glass and Bottle plastic
2	Metal	Alloy, bronze
3	Paper	White, brown papers, magazine, covers, carboard
4	Glass Bottle	All glass bottle

Source: Salim [9]

   - Library Research namely the method of data collection with search for data, learn a lot of data from various sources of books, modules, articles both the library and the internet related to that problem discussed.
3. Needs Analysis, this stage analyzes nonfunctional requirements and needs functional system.
   I. Functional Needs (Functional Requirement) which contains processes what the system does.
   II. Non-Functional Needs (Non-Functional Requirement), contains properties behavior possessed by the system.
4. System Design, at this stage the researcher designing software system models (software).
5. Testing, at this stage of testing done using Black Box testing. At this stage testing is carried out on every function contained in system, it is expected that the system tested can runs according to user needs.
6. Case study development based on data collection.
7. Testing, at this stage of testing done using Black Box testing. At this stage testing is carried out on every function contained in system, it is expected that the system tested can runs. System uses Android for operating system with following minimum hardware specifications:

Network	: GSM/HSPA/LTE
Dimension	: 148.5 x 71 x 9.4 mm; 140 grams
Screen	: 5.5 inch; IPS LCD capacitive touchscreen 480 x 960 pixel
Processor	: Spreadtrum 9850K quad-core 1.3 GHz
Memory	: 1GB RAM; 8GB internal memory
Camera	: Back Camera 5MP Front Camera 5MP
Operating System	: Android 8.0 Oreo Go Edition
Battery	: 2.450 mAh

The research framework used in this study is depicted as following:

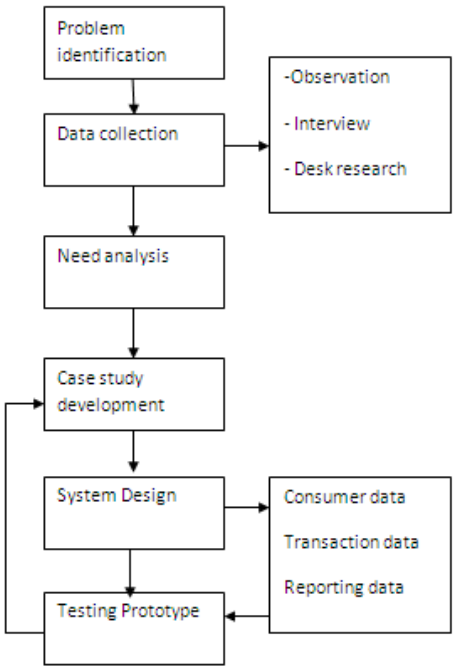


Figure 3. Research Flow

V. CASE STUDY: BANK SAMPAH AKADEMI KOMPOS (AKADEMI KOMPOS WASTE BANK)

Departing from the concern of seeing landfills that mount everywhere, and various natural disasters, and climate change caused by human ignorance about cleanliness and health by littering.

One of them is due to the wrong perception of waste, which considers that waste is dirty goods that must be disposed of, not as valuable items that can be recycled, as well as a lack of knowledge of proper waste management in areas especially around our housing, so we want to present for the Community as a Form of Concern in the Form of Concern for the Preservation of Environmental Functions, Environmental Management and Recycling of Household Waste and Household Waste.

Initially in 2006 Artomo as the initiator and founder of Akademi Kompos given consultation about composting to his neighborhood area. At that time based on government regulation, the waste was to be burned, so composting was not an idea that accepted widely by the society. After the 2008 the regulation about managing waste was amended. Burning no longer recommended due to the greenhouse effect. After 2008 composting activity is running well. In 2011-2012 at one time he saw there were 3 tanks in the corner of RW/RW with the purpose for making compost. He said it composting couldn't be like that because the tub was tightly closed. It must be modified. The community leader agreed and follows his advice and give the space location to start his initiative in making compost and recommend the people to participate. That moment that's when the Compost Academy began located in Bumi Pesanggrahan Mas, Pertukangan, South Jakarta. A year later in 2013, the waste bank was officially opened. The first year was passed by scorn from the surrounding environment. After 1 year they recruited Utami who was the leader of PKK (women neighborhood association) who invited her members to volunteer as waste bank customers. It was 2014 when the waste bank applied the Japanese disciplinary mindset. The waste bank operating hours are Friday every week. Utami mention that they started with the 49 people as customer. Currently there are 600 customers both collectively/group and individually customers. In detail they are 469 individual customers and 30 collective/group customers.

Utami pointed out that the largest increase in the number of customers occurred in the last two years. Especially group customers or collectives such as elementary school children around. In the neighborhood, the target is the maid or house assistants because they are processing and managing waste of the household. Although the participation firstly is a kind of forced participation.

It is to change the mindset that become the biggest challenge. You must change your and their mind. In 2016 Artomo start his initiative together with his wife to spread the information and socialization of the benefit of waste management around the neighborhood area. Soon, they got help from Utami the leader of women association in the area and three of them had put their all-out effort since to develop the Akademi Kompos and waste bank.

In order to attract participation from the target member Utami must collaborate with the Mosque leader and board by using the Zakat Coupon as attraction. Household maid and other waste bank potential customer are mostly beneficiaries of Zakat. So, if that zakat beneficiates want to get a zakat coupon then they must be a customer of this waste bank. So, the strategy is to attract those people to become waste bank customers here. In this environment, every year you will get the coupons distributed to the rightful ones, namely the zakat fitrah coupons, Eid Fitri and Eid Adha coupons. Now to attract interest and motivation to become a waste bank customer, then getting the coupon the recipients of zakat coupons are required to become customers of a waste bank. However, these conditions were challenged by the Leader and Board of the mosque foundation because basically those who are entitled to zakat are unconditional recipient. After deliberation, the middle ground was taken that the recipients of zakat were encouraged to become customers of waste banks, so they were no longer obligatory to be waste bank member or customer. With the fact that the number of zakat coupons distributed is limited, so the coupon policy is taken as a priority given to customers of waste banks. Utami proposal were discussed and protested, especially because there were no other rules in place. She then said that cleanliness is part of faith. Finally, he agreed but cannot rule the obligation as waste bank member as criteria of zakat beneficiary, but it was recommended that he become a customer of a waste bank. Now, the waste bank customer can feel the benefit of participating in this initiative with at least 6 million Rupiah on their balance every year and the feeling of proudness to be able to contribute to reserve the cleanness of the environment.

The waste bank membership consists of individuals and community groups of waste collectors. Where in the collection members can deposit waste in the minimum number of one kilogram of dry nonorganic waste in once deposit time. Deposits can be made by members or taken by bank officers during working hours and days. The balance withdrawal from customer accounts at waste bank can be done after three months of the customer saves or the amount of customer savings has reached a minimum of five hundred thousand rupiah. In its implementation, waste bank implements two types of savings, namely individual savings and collective savings.

To attract group member, they targeted to school children. Artomo used to go around and visit schools every Wednesday or Thursday and doing socialization on waste bank and the benefit they can get. So that the children become collective customers. Artomo was guide pleased to observe that the school children seemed very enthusiastic to become waste bank customer.

Waste bank managed to collect 5 to 7 million Rupiah every month. Or they collected around 1 ton of waste, mostly plastic and paper. The waste bank opens only once in a week every Friday morning to before noon. In within short business hours, an average of 50 or 60 customers are coming and making bank transaction. In year 2018 the total revenue reach IDR 70,832,729.

The bank took margin of 15% as the operation and administration cost not only for managing waste bank but also for Akademi Kompos. Just recently, they started discussion with BNI, one of public bank in Indonesia to open BNI branch and cooperating with waste bank. In general, BNI offer a more systematized operation for the waste bank and in this case the waste bank customer will automatically becoming BNI customer as well. The benefit that BNI offer to waste bank customer is they add no administration as to other regular customer.

Currently like other waste bank in Indonesia, they making partnership with Centre of Waste Bank (Bank Sampah Induk/BSI) which is Unit under Sub Dinas Kebersihan DKI Jakarta, or Sanitation and Cleanness Government Agency. BSI is the final collector and buyer of the waste collected by every waste bank unit in the designated region.

BSI is the official agency that buy and waste and turn into monetary value as credit balance for the unit waste bank customers. BSI in its operation will then supply the waste for other company who will recycle or reuse the waste for other end or material products. Apart from the partnership with BSI, waste bank also partnering with individual waste collector that will buy the waste from the waste bank. Like any other product, waste also has fluctuated price according to the supply availability. Therefore, waste bank will decide to sell the waste to BSI or other collector based on the price offered. As now with the technological advancement, waste bank is thinking to move to a more systematic process as well giving more benefit to its customer.

They are willing to open for technology use in the operation with the offers of more benefits such as cashless payment system and other value by having more partnership with service providers. They are thinking of having a waste bank card that valid to pay everyday payment necessities like bus ticket, electricity bills, children' school fee and probably getting more discounts for buying groceries and other bills. Artomo described that conferring the resource they have currently, partnership with sponsor, academic as well as industry will best to be developed to achieve the goal to preserve the environment as well giving benefit for the welfare of its customers and society. He closed the conversation with confidence that soon his dream will find the way and comes to reality.

Number and Facts about Akademi Kompos Waste Bank

Tabel 2. Volume of Dry Waste in Kg vs Number of Customer

Year	Volume (Kg)	Customer
2014	15,774	182
2015	29,895	309
2016	24,181	375
2017	29,933	407
2018	35,108	491

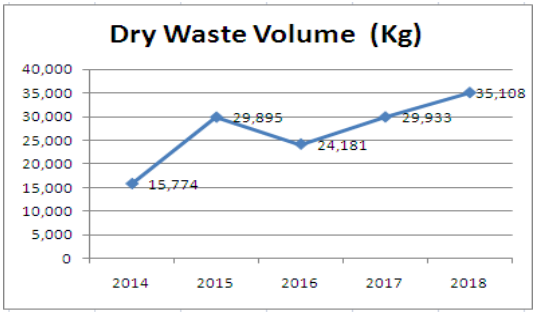


Figure 4. Growth of Dry Waste (Kg) Sold by Customer

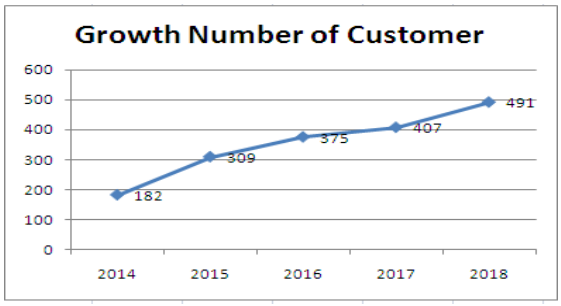


Figure 5. Growth Number of Customer

Tabel 3. Revenue in Rupiah

Year	Revenue (Rupiah)	Average monthly
2014	31,564,186	3,156,419
2015	49,314,351	4,109,529
2016	40,554,840	3,379,570
2017	57,846,780	4,820,565
2018	70,832,729	5,902,727

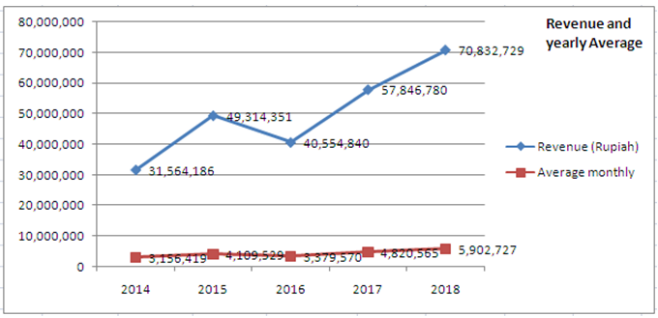


Figure 6. Growth Revenue and Average (Yearly)

Table 4. Monthly Volume of Dry Waste in Kg vs Number of Customer

	2014		2015		2016		2017		2018	
	Volume (Kg)	Customer	Volume (Kg)	Customer	Volume (Kg)	Customer	Volume (Kg)	Customer	Volume (Kg)	Customer
Jan	0	0	2,579	237	2,782	315	2,181	377	2,313	414
Feb	0	0	2,267	248	1,559	318	2,641	380	2,306	419
Mar	526	20	2,756	252	1,346	320	2,582	384	2,488	422
Apr	789	33	2,309	256	2,098	323	2,338	388	2,478	425
May	1,315	53	2,890	261	1,528	326	2,760	389	3,890	458
June	1,601	79	2,580	264	1,949	333	1,882	390	1,191	460
July	1,247	95	1,749	269	1,459	343	2,753	391	3,962	466
Aug	1,803	111	3,284	281	2,532	351	2,387	394	4,046	474
Sept	2,230	134	1,952	289	2,053	362	3,178	397	3,535	452
Oct	2,300	160	3,792	302	2,054	369	2,230	398	2,739	453
Nov	2,223	178	2,194	305	2,597	373	2,519	405	3,808	489
Dec	1,740	182	1,543	309	2,224	375	2,482	407	2,352	491
Total	15,774		29,895		24,181		29,933		35,108	
Average	1,577		2,491		2,015		2,494		2,926	

Table 5. Monthly Revenue in Rupiah

Month	2014	2015	2,016	2017	2018
Jan	0	4,972,000	4,453,200	3,782,100	4,752,010
Feb	0	4,079,100	2,739,250	4,253,450	4,736,460
Mar	1,033,545	4,757,800	2,324,080	5,619,740	5,272,150
Apr	1,550,318	4,234,135	3,619,750	5,233,500	5,145,160
May	2,583,864	4,592,410	2,571,720	5,455,000	7,740,783
June	3,394,573	4,794,350	3,234,850	3,680,850	2,235,230
July	2,404,000	3,309,900	2,168,400	5,508,190	7,722,520
Aug	3,791,000	4,872,676	3,933,780	4,688,390	8,493,000
Sept	4,625,700	2,862,840	3,601,260	6,185,000	6,910,380
Oct	3,546,911	5,423,980	3,842,650	4,231,040	5,536,320
Nov	4,714,275	3,128,810	4,423,600	3,997,000	7,965,236
Dec	3,920,000	2,286,350	3,642,300	5,212,520	4,323,480
Total	31,564,186	49,314,351	40,554,840	57,846,780	70,832,729
Average	3,156,419	4,109,529	3,379,570	4,820,565	5,902,727

Akademi Kompos activities including:

I. Kompos Academy Training

The Kompos Academy prepares education and training programs for school students (from kindergarten to university) and community groups, both in class and in the field.

Training Module:

- Environment and Management
- Organic Waste Management - composting
- Inorganic Waste Management
- Biopori
- Organic Vegetable Gardens

Training and counseling has been conducted at:

- Community Groups in Petukangan Selatan & Pesanggrahan, South Jakarta.
- Community Groups in Pesanggrahan District, South Jakarta.
- Community Groups at the Level of South Jakarta.
- Environmental Training and Composting for women neigbourhood community.
- Environmental Training and Composting for others islands Jakarta suburb area.
- Participation as a Speaker for Sharing Environmental Problems and Composting in the Jakarta Berkebun Community
- Dissemination of Inorganic Waste Recycling Banks
- Regularly provides training for the school teachers
- Receive visits from Environmental Practitioners as well as school children.

Figure 7: Waste Bank Activities

VI. PROPOSED BUSINESS MODEL FOR WASTE BANK

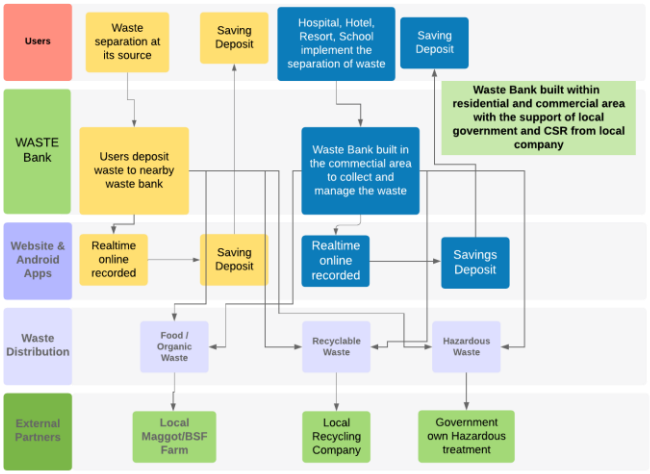
The positive mindset of the community toward the waste need to be developed in more fundamental and sustainable way. Socialization and education to the citizen and community for in order to increase the awareness and to develop their skills in waste management with following the principle of reduce, reuse, recycle (3R) is important not only in solving the waste problem but as well creating new potential source of income for the community.

Bank Sampah (the waste bank) with participation from all level of the community will become the social capital of community-based waste management [10]. The most importantly, the waste bank management plays a crucial role in empowering the society through participation-emancipator (interaction and communication) approach. The empowerment program for the citizens were conducted through counseling, education, training with as well as dialogue with the citizens in the targeted community. The community waste bank will not have the potential to grow without the involvement and support from the stakeholders. It becomes important to develop model and implement the partnerships, networking and institutional cooperation mechanism between the community, waste bank management, institution, business and government.

The integrated partnership on waste management with system information support can generate creativity and innovation as well as to improve the welfare of the community. The waste bank integrated business model is depicted in following:

Figure 8. Waste Bank Application Business Model

The customer



In waste management there are 2 types of customers: individuals (households) and corporate (industry such as hotels, restaurants, hospitals, etc.). Every customer can visit the Bank.

The nearest waste, specifically corporate customers (the region) can open a waste bank at the location by processing waste at its source in accordance with the mandate of Law No. 18 in 2008. Waste that can be deposited to the Waste Bank is organic waste (food waste) and recycled waste (for example plastic, paper, iron, board). Customers will also be taught how to sort waste types according to waste management partners.

The Bank Waste

Management of Waste Banks is handed over to the community in this case involving local government and private parties. Our party will conduct training to manage Waste Bank. Waste Bank operations will be obtained from the profit from the sale waste to the buyer. Management of a Waste Bank becomes a spearhead, then collaboration with companies is needed through CSR funds.

Waste Management Partner

Application provider will work with several partners in waste management. Organic waste will be managed by local communities. Recycled waste will be managed by the Association Indonesian Waste Entrepreneurs will buy all recycled waste from the Waste Bank. Dangerous and Toxic Waste (B3) is managed by the Government District / City with technology that will be assisted by application provider.

Use of Balance

Like other applications that can save money in the form of balance, this application will manage balances for waste bank customers. The plan, this balance will be given alternative in its use.

VII. CONCLUSION

Android-based application for waste bank data is needed to assist waste bank managers in providing information about all related transaction between customer and the waste bank. It is also provided role as media communication for all related information or for further new product and service developed for the customers. It assists bank managers to manage the customer and bank transaction and data base electronically and in addition to that it gives more security in term of customer data privacy. For business perspective, the web-based application may open for new opportunity by developing ads on menu and configuration in the application and the information system that fit with customer needs. The business model proposed that integrate the waste bank with partner in general an application base information system. The implementation of the business model will support and ensure the operation and transaction among partners where it also will be able to develop a more cash less society.

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