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Community-based Solid Waste Bank Model for Sustainable Education

Nur Indrianti*

Industrial Engineering Department, Faculty of Industrial Technology, Universitas Pembangunan Nasional "Veteran" Yogyakarta, Jl. SWK 104 (Lingkar Utara) Condongcatur, Yogyakarta 55283, Indonesia

Abstract

This paper deals with community-based solid waste bank development at the Quran education park (*Taman Pendidikan Al-Quran*, TPA) named Miftahul Jannah located in the Sonosari settlements, Tegaltirto village, Berbah subdistrict, Sleman regency, Yogyakarta Special Region, Indonesia. TPA is one of the non-formal religious educations in Indonesia that aims at improving the ability of students or learners to read, write, understand, and practice the content of the Quran. Miftahul Jannah solid waste bank (MJ-SWB) was developed to solve financial problem faced by the TPA due to students' poverty. The approaches used to develop MJ-SWB include training and counseling to local community, establishing waste bank system, as well as monitoring and evaluation. The bank system engages all community members to voluntarily and wholeheartedly participate in every stage of the system resulting in sustainable interactions. High participation from the community supported by harmonious relationship among community members enables the waste bank to run effectively. Factors influencing the success of MJ-SWB have been analyzed from the view point of leadership, socio-economic, gender issues, and professionalism. The result of the study shows that MJ-SWB can achieve economic, social, and environmental objectives. This proves that MJ-SWB is able to financially support the learning process of TPA Mifhathul Jannah in a sustainable manner.

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Keywords: household waste; waste bank; sustainable; education; Quran education park

* Corresponding author. Tel.: +6-281-328-478-192.
E-mail address: n.indrianti@upnyk.ac.id

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1. Introduction

National education in Indonesia is based on the official philosophical foundation of the Indonesian state, known as *Pancasila* (*panca* means five, *sila* means principles), and the 1945 Constitution of the State Republic of Indonesia Year 1945. According to the Law of the Republic of Indonesia Number 20, Year 2003, about National Education System, the national education serves to develop the ability and character as well as dignified civilization of the nation in the context of the intellectual life. It also aims at developing the student's potential in order to become a person who believes in and fears God Almighty, noble, healthy, knowledgeable, capable, creative, independent, as well as to become a democratic and responsible citizen. To achieve these objectives, the Indonesian educational path consists of formal, non-formal, and informal education which can be complementary and enriching. The legislation also provides a platform for religious education which aims to prepare students to be members of the community who understand and practice the values of their religions and/or to be a theologian. The religious education may be organized in formal, non-formal, and informal education.

One of the non-formal religious education systems in Indonesia is offered by the Quran education park (*Taman Pendidikan Al-Quran*, TPA). TPA aims at improving the ability of students or learners to read, write, understand, and practice the content of the Quran. The legal basis of the establishment of TPA lies in the Indonesian Government Regulation Number 55, Year 2007, about Religion, Education and Religious Education. The learning process in TPA is held in a beautiful, clean, neat, comfortable, and fun atmosphere as a reflection of the symbolic and philosophical value of the word "park". Funding sources of TPA include students' contribution, community fund/donors, government fund, as well as other kosher (*halal*) and non-binding funds.

This study deals with a TPA named "Miftahul Jannah" located in the Sonosari settlements, Tegaltirto village, Berbah subdistrict, Sleman regency, Yogyakarta Special Region, Indonesia. Currently, student interest in TPA Miftahul Jannah is quite high. The committee members also have high commitment to manage the TPA voluntarily. However, they are lacking in the number of donors and less regular financial contribution from students due to their state of poverty. This condition causes difficulty for the TPA in improving the quality of the learning process.

To solve the above problem, the TPA committee is considering the use of household waste generated by residents whose garbage has not been properly managed, as a potential source of income for the TPA. Limited landfills and lack of community understanding of environmentally sound waste management caused the waste to be disposed improperly. In this regard, in place of useless junk, the household waste can be utilized to generate income. The basic idea is that if every household produces waste and it can be collected and sold together to the waste buyer, then the money earned from selling the waste can be used to finance the operations of the TPA. This idea is in line with the approach proposed by Sujauddin *et al*. (2008), Singhirunnusorn and Sahachaisaeree (2008), and Singhirunnusorn *et al*. (2012), that is shifting the perspective of the garbage from "waste as resource" to "waste as an income generator".

The idea to utilize household waste as an income generator for TPA Miftahul Jannah was originally proposed in April 2012 by Sonosari mothers' affiliation named Family Welfare Development (*Pembinaan Kesejahteraan Keluarga*, PKK). PKK is an organization that empowers women to participate in the development of Indonesia. As a follow up to the idea, one month later TPA students started to collect their own household waste for the TPA. The collected waste was sold to waste buyer without structured and systematic management. In addition, not all parents were concerned about the action. About one year later, under the supervision of Universitas Pembangunan Nasional "Veteran" Yogyakarta, through the Community Services Grant, the household waste collection system at the TPA was further developed into a solid waste bank system using community-based approach (Nursubiyantoro & Indrianti, 2013).

The purpose of this paper is to explore how the community-based solid waste bank system developed at TPA Miftahul Jannah, is able to financially support the learning process of the TPA in a sustainable manner. The uniqueness of the system will also be discussed with reference to other solid waste recycling projects. In general, previous literatures have discussed the collecting system such as recycling rate, attitudes towards waste recycling, correlations between household characteristics, relevant socioeconomic factors as well as solid waste quantities and composition. This paper focuses more on community-based approach used throughout the development process of the solid waste bank. Furthermore, the solid waste bank system will also be discussed from the view point of services and sustainability concepts. In the final section, the evaluative result of the system will be presented.

2. TPA Miftahul Jannah

With regard to the concerns on the negative effects of technological progress, TPA Miftahul Jannah was established in October 11, 2009 by the youth of the Sonosari settlement and *Takmir* of Miftahul Falaah Mosque. *Takmir* refers to a group of people who have an obligation to prosper a mosque. The mission of TPA Miftahul Jannah is to contribute to the community in building a strong moral and character of future generation.

The coverage area of TPA Miftahul Jannah includes RW 14 of the Sonosari settlement. RW (*Rukun Warga*, which means community groups) is a level of village administration system in Indonesia. In Java Island, the *desa* (village) is divided into smaller units called *dusun* or *dukuh* (settlements). Dukuh is then divided into RWs, which is further divided into neighbourhood groups (*Rukun Tetangga*, RT).

The TPA Miftahul Jannah currently has 53 students and 9 *ustad/ustadzah* (male teacher/female teacher). The organizing committee consists of 13 local people. The TPA serves four grades of education. Grade A is for pre kindergarten and kindergarten children. Grade B and C is for the 1st to 3rd and 4th to 6th year of elementary school students respectively. Grade D is for junior high school students. Graduated learners of the TPA will receive a certificate from the Regional Director of Indonesian Direction and Development Institutions for Quran Kindergarten, Mosque Youth Communication Agency, Coordination Board for Quran Kindergarten, and TPA Miftahul Jannah.

The TPA Miftahul Jannah is accredited “B” by Quran Kindergarten and TPA Coordinating Agency of the province of Yogyakarta Special Region since February 9, 2013. The learning process at the TPA is set to follow the following standards:

- Learning process is done through classical approach and in private;
- Teaching materials are adapted to the curriculum in accordance with the level or learners’ age;
- Learning method is adjusted to the developmental age of the students by taking into account the principle of "playing while learning" or "learning while playing";
- Instructional media should be interesting and fun for students, safe and not harmful, meet the elements of beauty and neatness, raise the creativity of children, and support the planned teaching package; and
- Learning assessment includes cognitive, affective, and psychomotor aspects, and is conducted in a sustainable manner.

3. Community-based solid waste management

Solid waste or household solid waste in particular, is a multidimensional problem for urban communities in developing countries. Therefore, solid waste management (SWM) strategy is necessary. SWM refers to all activities pertaining to the control, collection, transportation, processing, and disposal of waste in accordance with the best principles of public health, economics, engineering, conservation, aesthetics, and other environmental considerations. SWM scope includes all attendant administrative, financial, legal, as well as planning and engineering functions (Salequzzaman *et al*., 2001).

Several SWM strategies are described in Thanh *et al*. (2010). An investigation on the per capita waste generation by residents, its composition, and the households’ attitudes towards waste management at Rahman Nagar Residential Area, Chittagong, Bangladesh was done by Sujauddin *et al*. (2008). Meanwhile, Dyson and Chang (2005) concluded that the prediction of MSW generation plays an important role in SWM. Chakrabarti *et al*. (2009) explored the possibilities of applicability in making an effective SWM policy for Baranagar Municipal area, adjacent to Kolkata Corporation area. In terms of household solid waste (HSW) generation and physical waste composition, Berneche-Perez *et al*. (2001), Ojeda-Benitez *et al*. (2003), Alhumoud *et al*. (2007), and Gómez *et al*. (2008) analyzed HSW to identify the waste generation rate and the potential for using recyclable wastes. Dennison *et al*. (1996a, b), Bandara *et al*. (2007), Sujauddin *et al*. (2008), and Qu *et al*, (2009) investigated the correlations between household solid waste quantities and characteristics, as well as relevant socioeconomic factors. In addition, waste generation for disposal habit, changes, and trends was also evaluated by Beigl *et al*. (2008).

Regarding solid waste recycling, Singhirunnusorn *et al*. (2012) explored solid waste recycling bank projects in Klong Toey slum, Bangkok, Thailand. In the beginning, there was an initial fund to financially support the bank operation. At present, the bank is independently operated by the community organization with minimal support from the municipality. A group of bank committee was formed to take care of administrative tasks and operations. The

recyclers could select to either receive cash for exchange or deposit credits into their accounts. Each participant gets part of the Bank's year-end profits. Members may also request for a small amount of loan for daily use and in a case of emergency. Furthermore, it was demonstrated that demographic attributes and socio-economic factors play a little role in waste separation and recycling behaviour at household level. Meanwhile, environmental knowledge and attitudes contribute to the perceptions of people, their awareness, and participation to the community-based recycling project. In addition, the continuous effort of informing process and raising awareness on environmental issues and proper solid waste management are crucial keys to the success of community recycling project. In conclusion, it was proven that the projects could reduce waste and improve environment cleanliness significantly. In terms of economic benefits, the project could create jobs and channel additional income for the community, while reducing the cost of solid waste handling and disposal for the city.

To ensure the success of the SWM system, there are some major criteria to consider in providing good services such as financial and operational sustainability (Lohri *et al*., 2014; Chakrabarti *et al*., 2009; Salequzzaman *et al*., 2001). In terms of managing HSW, public-community participation system is the most frequently suggested method (Chakrabarti *et al*., 2009). Through community participation, the method can encourage household behaviour to reduce waste from the source (Singhirunnusorn *et al*., 2012). According to Visvanathan (2006), community-based waste management (CWM) approach is based on the cooperative concept with the common goal of making changes in the communal solid waste management in terms of source segregation, recovery of recyclable materials, and storage prior to collection. The approach requires close consultation with community organization and full involvement from community members (Singhirunnusorn *et al*., 2012).

In many cities of developing countries, CWM projects such as the community-based composting projects from slums in Bangladesh have been introduced which includes the community composting and recycling schemes in Borommatrilokanat 21 community in Phisanulok province Thailand, and the “garbage for eggs” project in Klong Toey slum in Bangkok (Visvanathan, 2006). Two CWM projects were implemented by a community-based organisation to promote a sustainable integrated waste management system in two Indian cities namelyChennai and Hyderabad. The projects were intended to implement zero waste management by cleaning the neighbourhood through a door-to-door collection service of household waste and sweeping of the streets, to alleviate the burden on land for dumping by recycling as much waste as possible locally, and to give a recognized social status to local waste pickers by employing them to do the job. The projects demonstrated that it is possible to fulfil a social goal through integrated SWM (Colona and Fawcettb, 2006).

In general, the scheme of the CWM needs financial support to employ people who manage the waste such as waste pickers. One of the obstacles of the existing CWM includes limited contribution from the public to pay for and possibly supervise the work (Ali & Cotton, 2000 and Anschu¨ tz, 1996). In this case, communities can be assisted by either a micro-enterprise or an NGO or public–private partnerships that involve micro and small enterprises (Anschu¨ tz, 1996 and Maqsood Sinha & Enayetullah, 2000). For small scale composting, the local authority may offer financial support to invest, to any community that is ready to take a contract with a micro-enterprise which is responsible for generating money from the sale of that compost. Lohri *et al*., (2014) explored municipal waste services for a private waste company performed by Bahir Dar in north-western Ethiopia in 2008. Although the company activities led to substantial increases in the cleanliness of the city, its financial sustainability remains an unclear problem. Sujauddin *et al*. (2008) recommended initiation and enhancement of community-based solid waste management practices at each and every location in the municipalities with close collaboration from the government, as well as of other national and international organizations.

Asim *et al*. (2012) mentioned that recycling is widely recognized as sustainable SWM management strategy. To encourage household recycling behaviour, campaigning activities should be integrated into a project at community-based level. Waste recycling enhances the efficiency of recovering process, reduces the burden of disposal cost, and helps avoid the unnecessary and unhealthy disposal technologies. Household waste separation and recycling activities can be considered as another form of informal practices that could generate supplementary income for those categorised under urban poverty or economically underprivileged groups (Singhirunnusorn *et al*., 2012).

A community project can create a sense of belonging together with the role of community members to solve the common environmental problems. Community, which is the most important stakeholder in waste management activities, must also take an active part in solving the problems by modifying their behavior patterns for a more proper conduct of SWM. They need to be disciplined in separating waste such as using containers properly and apply environmentally friendly purchasing habits. Poly bags or small covered bins/containers of different colors and

shapes are placed at every household in order to help them to develop environmentally friendly attitudes (Sujauddin *et al*., 2008).

4. Methodology

The methods used for this research involve qualitative as well as quantitative approaches which include:

- Semi-structured interviews and informal discussions with the community and committee members;
- Documents analysis, particularly based on committee records;
- Direct observation of the work in progress.

5. The development of TPA Mifhathul Jannah solid waste bank

With regards to the function of TPA in serving the community, the committee understood that community is the most important stakeholder. Therefore, the development of TPA Mifhathul Jannah Solid Waste Bank (MJ-SWB) was done gradually through community empowerment approaches. This community approach can improve a sense of belonging together to manage the system. The development process includes the following activities:

a. Training and counseling to local community
   Training and counseling are necessary to improve community environmental knowledge and attitude so that there will be raising awareness in managing their household waste. The materials of the training delivered to the community included (1) negative impacts and benefits of household waste, (2) environmentally friendly waste management system, (3) techniques of separation and grouping based on waste characteristics, and (4) community-based waste management, in particular solid waste bank.
b. Establishing waste bank system
   MJ-SWB was launched in July 13, 2013. It was followed by the establishment of the organizing committee. The mechanism of MJ-SWB can be seen in Figure 1.

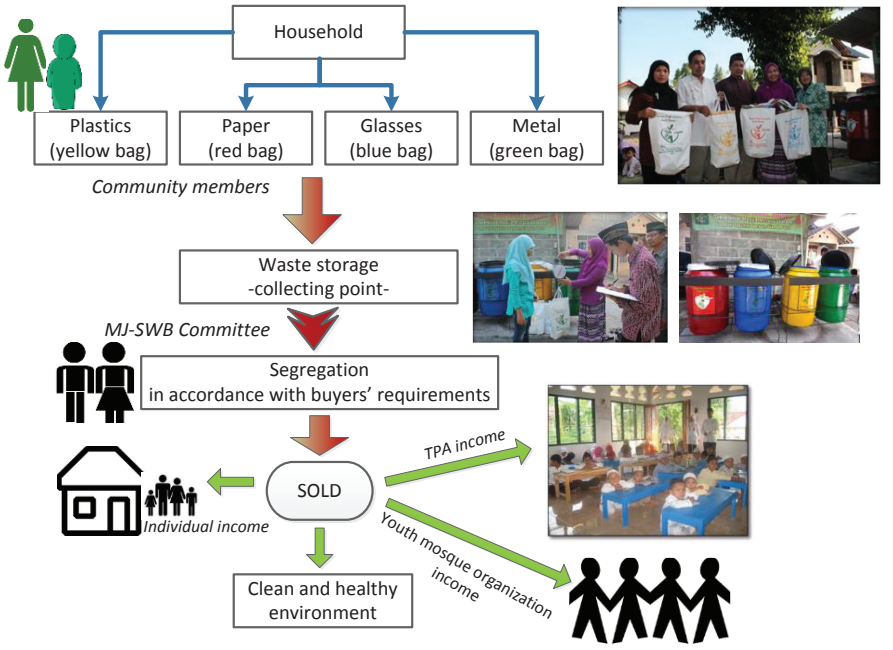

Fig. 1. Miftahul Jannah solid waste bank system

The MJ-SWB system consists of the following steps:

1) Households, as the bank customers, segregate and deliver their waste to the waste collecting point using fiber bags provided by the committee. Every household or family were invited as bank customer and received four bags from the committee, i.e. red for paper, blue for glasses, yellow for plastics, and green for metal. Waste collection is done every Sunday morning. The committee also provides different colours of temporary garbage bin collectors in the TPA area.
2) The committee weighs the waste deposited by customers and records it in a log book.
3) The committee re-separates the collected waste in accordance with buyer's requirements. For example, paper is further separated into white printing paper, newspaper, and carton.
4) The committee sells the waste to waste buyers. In this case, the committee has established partnership with several waste buyers.
5) The committee distributes the money earned from selling the wastes based on the community agreement, i.e. 75% for TPA operations, 15% for the mosque youth organization named "*Perisaimas*" (gold shield), and 10% for customer or waste owner.
6) Each customer receives money earned from waste they deposited at the end of the year.

The organizing committee of MJ-SWB consists of RW Chairman as the advisor, TPA Director as the chairman, 15 youth TPA administrators as committee members, and 7 PKK members.

c. Monitoring and evaluation

Monitoring and evaluation is done once a year. It is usually held at the end of the year. Since most of the customers are PKK members, the result is presented particularly to PKK members in its yearend monthly meeting. Here, the committee presents the progress of the waste bank and announces the best customer with the biggest waste deposits.

6. Discussion

This paper has discussed the development of community-based solid waste bank at the TPA Miftahul Jannah (MJ-SWB). The bank system illustrates collective efforts by the community to financially support the operation of the TPA to achieve better quality learning process that may result in increased community well-being.

In terms of services, the MJ-SWB can be categorized as a noncommercial service, particularly public service that aims at improving societal welfare. As defined by Moenir (1995), noncommercial services attempt to provide assistance to people in order to achieve a particular goal done by a group or a person or a bureaucracy. In terms of societal welfare, Rosenbaum *et al*. (2011) mentioned that improving consumer and societal welfare through service becomes the focus of transformative service research (TSR). TSR is defined as "service research that centers on creating uplifting changes and improvements in the well-being of individuals (consumers and employees), families, social networks, communities, cities, nations, collectives, and ecosystems" (Anderson *et al*., 2011). In other words, the MJ-SWB is a real practice of TSR. In this case, beyond the mothers as consumers at individual level, there is RW community as collective consumer entities.

Besides financial support for the TPA, the establishment of MJ-SWB has given positive impacts to RW 14. These include (1) the emergence of community awareness towards an environmentally sound waste management, (2) the increase in community knowledge about the negative impacts and benefits of waste, particularly household waste, (3) the establishment of community culture and behaviour towards garbage, which was previously shunned but has now become one of the society's commodities, (4) the establishment of a sense of caring and mutual cooperation among community members as a result of the waste bank system which is formed from village to neighbourhood level, and (5) the establishment of clean and safe environment.

The following are factors influencing the success of MJ-SWB:

a. Leadership

The chairman of the waste bank, who is also the director of the TPA, is a well-respected figure in the community. He is a knowledgeable person as he is an employee of a college. As mentioned in previous literatures, the level of formal education and knowledge shall be positively associated with recycling behaviour. Moreover, the chairman of the RW where the TPA is located strongly supports the waste bank initiative. This becomes a great encouragement for the community to participate actively.

b. Socio-economic
Unlike the waste banks presented in previous studies which initially obtained financial support from other parties, MJ-SWB was fully established based on the initiation from the community without intervention from other parties. The bank system engages all community members voluntarily and wholeheartedly to participate in every stage of the system. High sense of community as a brotherhood results in good relationships among community members through respectful, collaborative, and sustainable interactions. In addition, close relationship and good communication between the committee as service provider and the community as consumers enables MJ-SWB to run more effectively.
The involvement of community members and their sincerity in contributing most of the money earned from selling the waste will ensure the sustainable funding for the TPA. Moreover, MJ-SWB management is entirely done voluntarily by the communities themselves without hiring another person. This will reduce management and handling cost so that there will be more income for the TPA.
A sense of awareness and responsibility owned by the youth of the village to improve the welfare of the village and the quality of the TPA are also important factors. This sense of awareness and responsibility, supported by a harmonious relationship among them, has motivated them to become waste bank committee members voluntarily. This situation should be continuously maintained so that it can become a sustainable asset to manage the waste bank.

c. Gender issues
The involvement of PKK has a significant impact. This is because recycling activities at household units is a major function of the system and mothers are nevertheless, the ones in charge of dealing with the garbage at home. In other words, PKK or women community are able to take responsibilities and to work for the system.

d. Professionalism
Committee members are mostly college students. As knowledgeable people, they can easily receive instructions for managing the waste bank. Although it has never been officially instituted, the involvement of young people in managing the TPA Miftahul Jannah has been happening for generations. If this can be maintained, then it can be the basics for sustainable voluntary management.

In 2013 there were 38 families registered as MJ-SWM bank customers. In 2014, after the introduction of MJ-SWM in which customers must collect their waste to the waste storage by themselves, there were 23 active customers. In addition, there were 15 customers who requested for a committee to collect their waste. The results show that after closing the 2014 yearbook and reporting progress, the number of the active customers increased to 30 families and non-active customers decreased to 8 families. This shows that the community trust to MJ-SWB has increased.

To increase the performance of the waste bank, there are some issues to consider. Currently MJ-SWB utilizes an unoccupied residential house as a temporary waste storage. This will be a problem when the house is occupied by their owners one day. Therefore, the committee should start thinking about a permanent waste storage location. In terms of recycling rate, the volume of waste collected by the community is rather low. This is because RW 14 Sonosari where the TPA is located consists of only 2 RT or 60 families. Some of them are farm workers so they have almost no garbage. As mentioned by Singhirunnusorn *et al*. (2012), larger households with higher number of family members and square footage tend to have higher recycling rates. In terms of economic status, higher-income households show higher numbers of recycling rates. The case of MJ-SWB proved this situation. According to the MJ-SWB committee record, customer with the highest waste deposit comes from a high income family.

The low volume of waste collected by the community will certainly have negative impact on TPA income. To increase the volume of waste, some community members are more than glad to collect paper or plastic wrappers of food or drinks from the meetings they attended. Furthermore, the committee plans to offer their professionalism in managing the waste as a package of services to manage waste of neighbouring RWs. Some nonmuslim families who have not participated as bank customers will be offered to take special package in which donations for the TPA is not obligatory.

7. Conclusion

The TPA Miftahul Jannah solid waste bank presented in this paper has been put forward as a model for community development and sustainability. The bank system engages all community members to voluntarily and wholeheartedly participate in every stage of the system resulting in sustainable interactions. The case study also relates to collective well-being of consumers and is the real case of TSR concept.

In terms of economic aspect, MJ-SWB generates income for the TPA. It also raises community awareness to practice environmentally sound waste management. Social impact is evident by an increase in harmonious relationship among community members. In addition, the involvement of mothers from women affiliation has also increased the number of activities and social awareness campaigns. Furthermore, the MJ-SWB has provided experience for the young generation who participates in the committee voluntarily. Their activities in managing solid waste have instilled real leadership and managerial practices amongst them. Indeed, social values owned by Sonosari community where the TPA is located, has made the community-based solid waste bank model as a potential method to financially support the TPA in a sustainable manner.

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