



LAHDEN AMMATTIKORKEAKOULU
Lahti University of Applied Sciences

INITIATING A COMMUNITY-BASED SOLID WASTE MANAGEMENT SYSTEM IN A RURAL COMMUNITY IN GHANA: A PRACTICAL FRAMEWORK

Case: Akrofu-Xewiwofe

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Tommi Nissinen

Arttu Vanninen

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NISSINEN, TOMMI &
VANNINEN, ARTTU:

Yhteisöpohjaisen jätehuoltojärjestelmän
aloittaminen ghanalaisessa
maaseutuyhteisössä: käytännön
viitekehys
Tapaustutkimus Akrofu-Xewiwofen
kylässä

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TIIVISTELMÄ

Kehittyvien maiden jätehuoltojärjestelmät ovat tavallisesti monilta osin toimimattomia: tehoton jätteen keräys, avoin kasaaminen ja säätelemätön polttaminen tuottavat monenlaisia ongelmia. Toisin kuin kaupunkialueilla, maaseutuyhteisöillä ei tavallisesti ole virallisia rakenteita jotka käsittelevät jätettä; tästä seuraa useita ei-toivottuja terveys- ja ympäristövaikutuksia.

Tässä tutkimuksessa esitellään käytännön viitekehys, joka ohjaa jätehuoltojärjestelmien kehittämistä maaseutuyhteisöissä. Viitekehys perustuu dialogiseen lähestymistapaan, missä paikallinen kulttuuri otetaan huomioon ja missä oppiminen on jatkuva prosessi.

Viitekehystä pilotoidaan yhteistyössä paikallishallinnon kanssa Akrofu-Xewiwofen kylässä Hon kunnassa Ghanassa, alkaen toukokuussa 2012. Pilottivaiheessa viitekehystä kokeillaan käytännössä, ja samalla voidaan havainnoida mahdollisia lähestymistavan mukanaan tuomia haasteita.

Asiasanat: jätehuolto, yhteisöpohjainen organisaatio, kierrätys, kompostointi, viitekehys

Lahti University of Applied Sciences
Degree Programme in Environmental Technology

NISSINEN, TOMMI &
VANNINEN, ARTTU:

Initiating a Community-Based Solid
Waste Management System in a Rural
Community in Ghana: A Practical
Framework
Case: Akrofu-Xeвиwofe

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ABSTRACT

Typically a solid waste management system in a developing country displays several problems, such as low service coverage, open dumping and unregulated burning of waste. Unlike in urban areas, rural communities usually have no official structures to handle the waste, which results in various undesirable health and environmental effects.

In this study a practical framework is introduced which guides the development of solid waste management systems in rural communities. The framework is based on a dialogic approach in which the local culture is taken into account and learning is a continuous process.

The framework will be piloted in a case community of Akrofu-Xeвиwofe in Ho Municipality, Ghana, in co-operation with the local government, starting May 2012. In the pilot phase the framework will be applied in practice, and possible challenges brought up by the approach can be observed.

Keywords: solid waste management, community-based organization, recycling, composting, framework

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TERMS

Capacity building = developing human talent in a way that enhances their abilities to achieve tangible and sustainable results; includes education and engaging efforts to raise practical awareness through discourse

Community-based organization, CBO = non-profit organizations that operate within a single local community

Dialogue = a communication process that is characterized by free flow of meaning, suspension of judgement and building the discussion on other individuals' ideas

Environmental Health Unit, EHU = the organizational unit in Ho Municipal Assembly that is responsible for waste management and sanitation promotion within the municipality area; the head of the unit is Municipal Environmental Health Officer, with Environmental Health Officers as subordinates

External actor = representatives of development projects or non-governmental organizations that approach the communities with the intent to guide them to develop

Hazardous waste = waste that poses significant threats to public health or the environment; typically includes batteries, oils and pesticides

Ho Municipal Assembly, HMA = the local government of Ho Municipality

Liquid waste = wet waste fractions, typically human faeces and urine mixed with water

Non-governmental organization, NGO = organizations that do not form part of the government and are not conventional for-profit businesses

Recycle = processing used materials (waste) into new products to prevent waste of potentially useful materials

Sanitation = hygienic means of promoting health through prevention of human contact with the hazards of wastes; in Ghanaian use, typically includes waste management efforts

Solid waste = waste fractions that are solid and not especially harmful; usually plastics, organic waste, metals etc.

Solid Waste Management, SWM = organizing the collection, transportation and siting of solid waste in a systemic way

1 INTRODUCTION

Solid waste management (SWM) is typically considered to be a responsibility of the local government, which either provides the service by itself or contracts private sector companies to handle the waste. In developing countries, however, for SWM to be economically viable for private companies the waste volumes have to be large; this focuses the companies' efforts on urban centers and typically excludes rural communities from the scope of the services provided by the companies.

Rural communities, at least in Ho Municipality, Ghana, typically dispose of their waste in unmanaged dumps that are located within a walking distance from the community. These pose considerable health risks for the community: rotting waste can draw pests, hazardous components can accumulate to domestic animals that are later used for consumption, and stagnant water enables malaria-spreading mosquitoes to breed near the communities.

In this study, the authors present a practical framework for establishing an SWM system in rural communities via community-based organization (CBO). Rather than depending on external funding, this framework makes use of the potential that lies in the communities: harnessing indigenous experience and local materials engages the community in a more profound level.

In this framework, CBO is seen as a type of communal project that includes structured management practices. This approach also encourages the community members to acquire skills that can be useful later on, for example while establishing small businesses. In this way establishing a functional SWM system can act as a gateway to wider community self-government. In this process of empowerment, the local government should operate as the initiator and mentor; the community, however, is the central actor.

2 BACKGROUND INFORMATION

2.1 Research Method

The research question in this study is: What are the challenges in developing solid waste management systems in Ho Municipality, Ghana? The support questions are: How can such systems be initiated in rural communities? What practical issues should be considered in these cases?

This study follows a systemic approach in which different parts of the subject have been discovered during the process. Practically this means that there was no clear picture of the systems in the beginning of the study, but that the theory has been developed during the discovery process through constant feedback. Rather than being objective research that seeks to describe the systems in question in a detached manner, this study is intended to function as a part of the development process; the typical framework of separate theory formation and application is replaced with a more dynamic approach.

Data collection in the study is based on personal inquiry and literature review concerning solid waste management systems in developing countries.

2.2 Solid Waste Management in Developing Countries

In developing countries, improving solid waste management (SWM) has been the focus of numerous projects by external support agencies during the last decades. Many of these projects have not been able to support themselves after the agencies have discontinued their support. This has been due to many factors; economical, social and cultural aspects have a strong effect on complex systems such as SWM. Also, often the scope of these projects has not been comprehensive enough to take into consideration the external factors influencing the systems. (Ogawa 1996.)

Typically an SWM system in a developing country displays several problems, such as low service coverage and irregular collection, open dumping and unregulated burning of waste. Informal waste picking or scavenging in city areas

and open dumps is a usual way for poor and uneducated people to sustain themselves, which creates constraints for radical upheaval of the SWM system. (Ogawa 1996.)

Ogawa (1996) has categorized possible constraints of SWM to five categories: technical, financial, institutional, economic and social constraints. However, it is necessary to consider them as the different sides of the same issue; lack of technical expertise is linked to the generally low financial priority of SWM in local governments, and weak economic base is likely to result in unwillingness to pay for SWM services. Hence, improving SWM sustainably implies a comprehensive approach to cooperating with local governments and communities in developing countries. This requires a certain paradigm shift in development co-operation, in which the idea of foreign ad-hoc aid is replaced with political co-operation and institutional reconciliation (Dia 1996).

2.3 North-South Local Government Co-operation Program and Project

The North-South Local Government Co-operation Program is an effort by the Association of Finnish Local and Regional Authorities to strengthen the role of local governments in Sub-Saharan Africa. The program started in 2002, and there are currently 16 linkages between Finnish and African local governments. It is funded by the Ministry for Foreign Affairs of Finland. (AFLRA 2010.)

The co-operation project between the City of Lahti, Finland and Ho Municipal Assembly, Ghana (HMA) started in 2010, and it focuses on environmental matters such as promoting ecological sanitation and improving the state of waste management in Ho Municipality. The project has concentrated on developing and spreading the use of a composting dry toilet model already when it was officially run by the City of Järvenpää, Finland. In the future more focus will be put on waste management, water protection and developing environmental management. (North-South Local Government Co-operation Project 2012.)

In 2010 a Waste Management baseline review of Ho Municipality was carried out, which explored the current constraints in waste management, mainly in the city

area (Siri 2010). The authors' input to the project started in May 2011 through preliminary work and attending the waste management working visit in Finland by Ho Municipal Officials. From June to August 2011 the authors carried out a practical training period in Ho that involved reviewing the current waste management practices and getting to know the Environmental Health Officers' day-to-day work. Workshops about composting and waste management for Environmental Health Officers were also carried out.

2.4 Ho Municipality

Ho is a municipality of approximately 237 000 residents, located 166 km northeast from the capital Accra. It is the capital of Volta Region on the border of Togo. The city of Ho has 60 000 residents. Approximately 65 % of the residents live in rural areas. Farming is the largest source of livelihood: typical plants are yam, cassava, plantain and maize. (Medium Term Development Plan 2010-2013.)

The official language in Ho is English, and the main native language is Ewe, a Niger-Congo language that is often the only one spoken by elderly people and in rural communities.

The climate in Ho is characterized by rainy and dry seasons. Temperatures during the rainy season are usually around 27 °C. Rainfall is strongest in May and June, when the average is 160 mm per month. During the dry season the rainfall is typically 30 mm per month. Then the temperatures are around 30 °C. The relative humidity is 97 % around the year. (BBC 2012.)

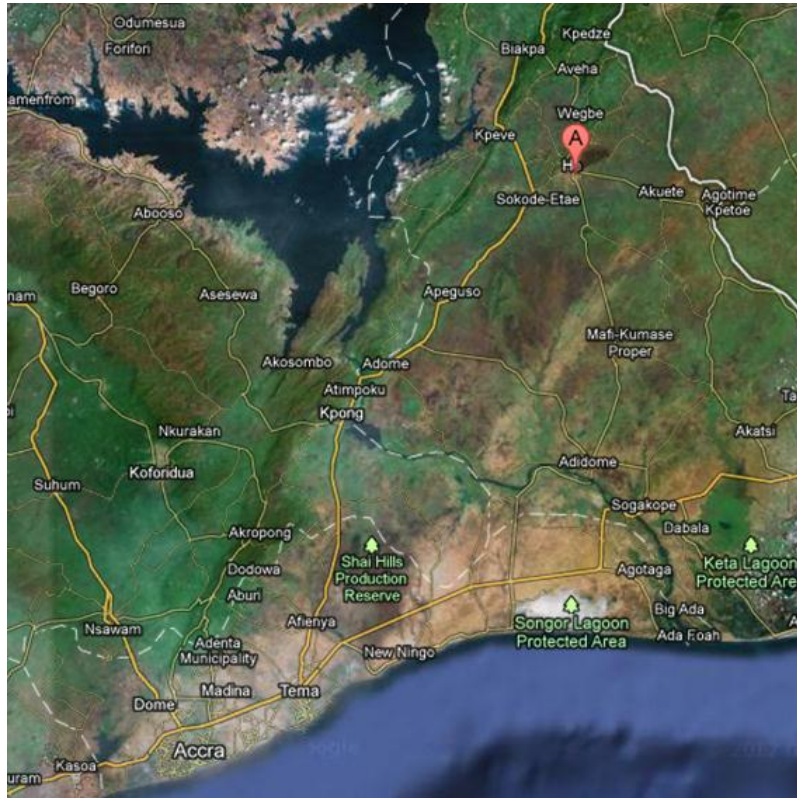


Figure 1. Map that shows the location of Ho Municipality (marked A) in Ghana. (Google Maps 2012.)



Figure 2. General view on the main street of Ho.

2.5 General State of SWM in Ho Municipality

In the Ho Municipal Assembly organization, the Environmental Health Unit (EHU) is responsible for sanitation and hygiene promotion both in the city and rural areas. The head of the unit is the Municipal Environmental Health Officer (MEHO); Mr. Richard Aghiabede has worked in this position since 2010.

In the unit there are 45 Environmental Health Officers and 20 Sanitation Guards who are responsible for checking sanitation practices of households and food premises. Each officer has their own area for which they are responsible. Some officers operate in the city area and others in the distant areas. The officers usually have little means to reach remote communities.

Inside the EHU there is a Municipal Water and Sanitation Team that works with community-based organizations (Water and Sanitation Committees, WATSAN). Together they manage point water sources and oversee household latrine maintenance and hygiene promotion in rural communities that are dependent on their own water sources. Water supply systems are owned and managed by the respective community on a demand-driven basis. (Juvén & Perttola 2011.)

In Ho, waste collection was privatized in 2007 to Zoomlion Ghana Ltd. According to the service agreement, Ho Municipal Assembly pays Zoomlion 14000 Ghana Cedis per month for two skip loader trucks and twelve solid waste containers (Ho Municipal Assembly 2007).

The company takes care of the collection and final disposal of waste in Ho, and it operates mainly in the city area. Waste is collected with garbage trucks, motor bikes and tricycles. Approximately 60 tons of waste is sited at the municipal dumpsite per day; annually this means 21 600 tons of waste. 80 % of Zoomlion's funding comes from the government of Ghana and 20 % from the citizens covered by its services. The waste management levy is 5 GHC per month per household. (Siri 2010.)

The company also makes contracts with customers, providing them with branded waste containers and regular emptying. In addition, Zoomlion operates on an

informal level directly with households; tricycle collectors can visit households and the residents pay a one-time fee directly to the collector.



Figure 3. Zoomlion-operated skip container truck



Figure 4. Tricycle that is used to collect household waste

Currently all waste from the city area is brought to one dumpsite that is located approximately 20 minutes' drive away from the city. The dump is not officially managed; however, a couple of waste scavengers operate around the dumpsite, collecting valuable materials such as metal and selling it to a recycling company which sells it to interested buyers.



Figure 5. Waste fires are common in the municipal dumpsite.



Figure 6. There are a couple of scavengers that collect valuable waste on the municipal dump.

In the city area waste is collected in skip containers that are scattered around the city. The containers are generally emptied by Zoomlion when they are full, but sometimes the emptying is delayed, which causes waste to accumulate around the containers. Most waste is produced during market days which are held every five days.

There are numerous scavengers operating in the city area collecting metals and selling it to the recycling company; they collect wastes from households and companies and also from the public skip containers.



Figure 7. During market days, the amount of waste produced tends to increase considerably. A view of a public skip container near the marketplace.

Zoomlion is responsible for cleaning public places to some extent, but the service agreement only mentions that the company provides “specific waste management services” without mentioning service level, which causes confusion and disputes between HMA and Zoomlion about what is included. According to many municipality workers the cleanliness of public places has deteriorated considerably since the privatization. Gutters in the city are typically used to

dispose of waste, and Zoomlion workers also sweep street waste to them. Municipal officials supervise cleaning efforts by Zoomlion on a regular basis.



Figure 8. Gutters in the city area are usually littered.

The co-operation project helped the Municipal Assembly to install 15 metallic refuse bins around Ho city center beginning in the end of 2010; however, problems emerged when residents started filling the bins with their own household waste. The emptying of the bins has also been ineffective, since Zoomlion has been reluctant to empty them regularly, based on the fact that they are not paid for this service.



Figure 9. Metallic refuse bin installed by the co-operation project.

Based on our observations, SWM in Ho Municipality has three major challenges:

1) Confusion about responsibilities and management

Responsibilities are not clearly stated inside HMA and between HMA and the private sector. This confusion is also reflected in official contracts and organizational structures; for example, the contract between HMA and private waste management Zoomlion Ghana Ltd. has no clause about the required service level. (Ho Municipal Assembly 2007.)

2) Lack of coordination and co-operation

Neither the private sector nor citizens are engaged in a joint process with the local government. This causes disputes about basic services such as emptying private litter bins, and makes planning of SWM difficult.

3) Absence of systemic approach

The municipal organization lacks engineering knowledge about SWM issues, which induces solutions that seem effective in the short-term, but actually are ineffective in the long run. This is mainly because of a lack of systemic planning and appointed personnel who possess the required skills to solve waste-related issues. An example of this absence of systemic planning is HMA's intent to purchase a motorized tricycle for emptying public refuse bins that currently are not effectively emptied by Zoomlion; this further mixes the responsibilities between the public and private sectors and has the potential to confuse the situation.

The authors do not see lack of funding in SWM as one of the main obstacles of a functional system; while money plays an important part in the functioning of SWM, focusing on ineffective funding systems distracts from the actual issues such as those mentioned above that require more capacity building efforts than funding. Nonetheless, sustainability of funding is a central issue in the long term.

Partly these issues are caused by the HMA organization that is structurally confusing, at least to an outsider. There seem to be parallel structures and unclear titles for units and personnel that do not quite match with the content of the work. Sharing of information inside HMA is also inefficient, which may cause overlap of efforts. In addition, the transfer system of government officials in which they are transferred to other local governments every couple of years is challenging for long-term capacity building efforts.

In the city area, there are long-term efforts to improve waste management: The Ghana Urban Management Pilot Project (GUMPP) focuses on developing the living conditions of four selected cities in Ghana, of which Ho is one (AFD 2010). In the field of waste management this means locating a sanitary landfill with

recycling and composting facilities and placing new waste containers (300 refuse bins and 100 skip containers) in the city area. In addition, the project seeks to build HMA the capacity of three SWM engineers. (GUMPP 2010.)

2.6 Policy Goals

The recently revised national Environmental Sanitation Policy states that there should be a Waste Management Department in every Municipal Assembly in Ghana. The policy also states that the local governments should establish active co-operation with other support agencies that work in the environmental sanitation sector such as community-based organizations and non-governmental organizations (NGO); the local governments should examine ways of developing coordinated efforts with the support agencies for mutual benefit. (Ministry of Local Government and Rural Development 2010.)

In the policy, the importance of community-based organizations and NGOs is emphasized; it is seen as their duty to assist the local governments and communities in the planning, funding and development of community sanitation infrastructure for the safe disposal of wastes and the prevention of soil, water and air pollution (Ministry of Local Government and Rural Development 2010). On the local government level the targets stated in the national policy are implemented through Municipal Environmental Sanitation Strategy and Action Plan (MESSAP).

This study can be seen to support these policy goals on the local level, strengthening collaboration between the local government and communities through structured efforts.

3 LESSONS LEARNED FROM COMMUNITY BASED SWM – CASES FROM VIETNAMESE AND AMERICAN INDIAN COMMUNITIES

SWM is a complex task which depends a lot upon organization between households, communities, private enterprises and government authorities, and their mutual co-operation. However, while technical solutions play an important part in SWM in industrialized countries, in low income countries for the SWM systems to be sustainable they cannot be based on highly technical and expensive systems that require expert maintenance.

Community-based SWM can be seen as a novel approach to SWM, which has largely been dominated by the public and private sector divide. In a community-based SWM model the community is seen as an active actor that is able to effectively manage its wastes given the capacity and know-how to do so. The public officials have the role of an initiator and an instructor.

3.1 Community-Based SWM in Minh Khai, Vietnam

In Minh Khai, Vietnam, there was no system of SWM until 1999, when the local Women's Union developed an experimental trial of waste collection in co-operation with the community organization representative. The representative is elected annually and is included in all community-based organizations, unions or associations recognized by the local government. The Women's Union initiated a daily, curb side waste collection system; after two months a waste collection fee was established and a formal system was initiated. During the time of the study, fees were collected house by house twice a year in a coordinated effort between the organization's leader and the head of the Women's Union. (Richardson 2003, 22, 27.)

In 2003 the level of participation in the collection was 97 % of households. The 3 % who did not participate said they felt capable of dealing with waste themselves. According to interviews, this unwillingness to participate was partially due to the fact that some did not want to pay for the service. In addition, there were several known free riders that put their waste outside other houses in the belief that the

waste would be collected. This had resulted in dissension when all residents felt that the other party was responsible. In any case, free riding is slowly being eliminated as residents become more aware of those who free ride and contact the organization to deal with the situation. An important factor in the current high participation is that the participating residents and members of the Women's Union have been successful in describing the system's benefits and thus encouraging others to participate. (Richardson 2003, 27.)

In Minh Khai, the community organization representative is responsible for the community's SWM organization (see Figures 10 and 11). The organization's leader is officially authorized to institute or overturn policies and decisions made in community meetings as he sees fit. Practically, however, all decisions are made collectively. Community referendums are held in cases where the whole community is affected by the outcome of the decisions. Minor decisions such as those concerning collection routes are discussed internally by the organization's six members. Meetings including the entire community were more frequent at the implementation stage of the project, but in 2003 they were held approximately every six months. (Richardson 2003, 24.)

The waste collection works so that on alternate days collectors are responsible for collecting waste from participating households as well as sweeping streets and collecting fallen branches and leaves. The residents know the approximate time when the collector arrives at their houses; when the collector rings a bell, residents bring their waste to the street and place it in the collector's dust cart. (Richardson 2003, 25.)

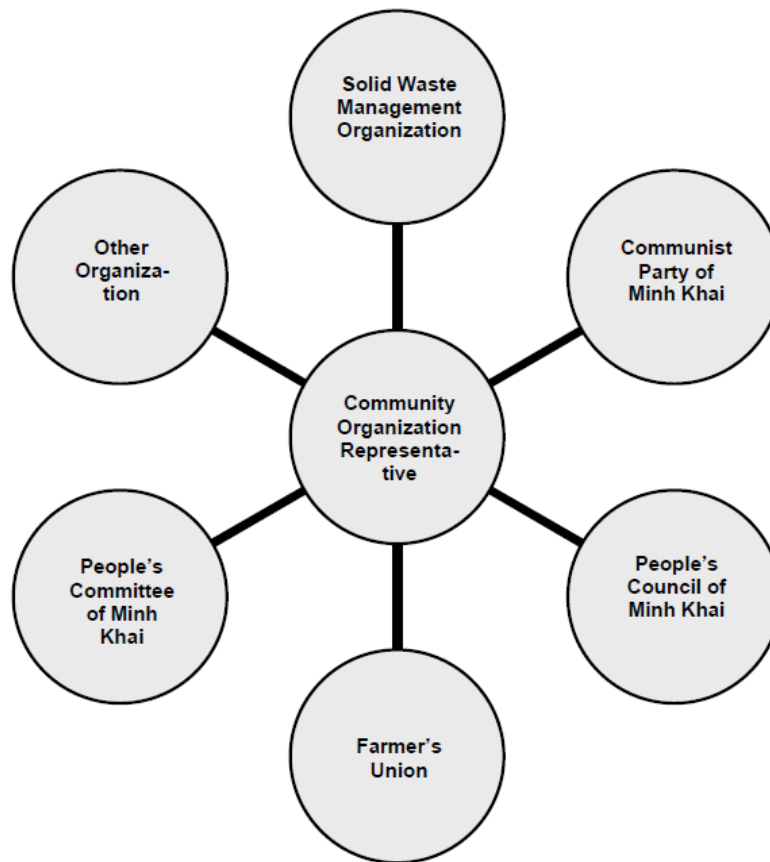


Figure 10. Structural representation of community organizations in Minh Khai. (Richardson 2003, 23.)

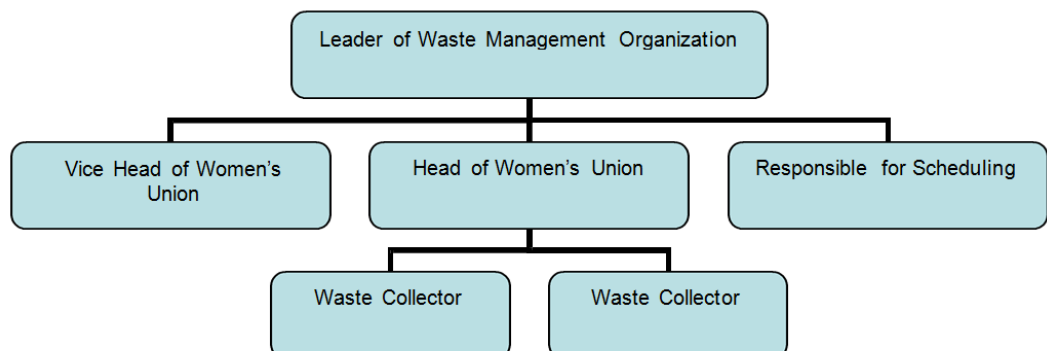


Figure 11. Minh Khai's community-based SWM organizational structure. (Richardson 2003, 24.)

3.2 Environmental Education in Communities: Case of SWM in North American Indian Reservations

People think and communicate based on their experience of the social and cultural context around them, as well as their personal characteristics (Hofstede et al. 2010). Effective communication and learning are essential in implementing an SWM system in communities in which such systems have not been implemented earlier (Zender 1999).

Zender explores several cases in the North American Indian reservations where education carried together with an SWM project has been ineffective because of miscommunication, poor definition of roles between community members and educators, lack of holistic approach and bad “formatting” in teaching. (Zender 1999, 44.)

In the Indian reservations, miscommunication in environmental education could be seen in the way that the message is delivered. The traditional “Indian Way” of doing things includes teaching by the tribe elders. Communication is also calmer in the tribal-reservation culture: for example, the act of looking down and silence after a speaker has finished are signs of respect. (Zender 1999, 45.)

Definition of roles is important also inside the community. While an outside consultant may impress the people in the tribe, that does not imply effective environmental education; Indian people are more receptive to learning from elders, family and other tribal authorities. An outsider, staying in the community for only a short period of time, lacks the legitimacy of a teacher. (Zender 1999, 45.)

Holistic approach can be seen in the way knowledge is connected to other things in the community. The knowledge must be relevant for life now, and to achieve this it must be framed so that it supports community goals. In the education carried out in the Indian reservation, consultants did not include effective framing (e.g. framing a transfer station as the appropriate way of returning waste to earth) but people were told that their solid waste was “dirty” and did not belong to the

ground. Also, the conventional education included presenting open dumping as “bad” and use of transfer station as “good” without a community context. A tribal member summed up the experience with the consultants: “They just didn’t know us, it wasn’t working. They came in and thought they knew everything. So no one listened.” (Zender 1999, 46.)

Once the tribe took over the education program it started to pay off. Elders were recruited to teach children harmony-with-nature values, and they were also taught about the harmful effects and pathways of waste contamination through visual demonstrations. Community members were also empowered to have a stake in the functioning of the system: children made signs and posted them in public places, and members were trained in the cleaning up of the problematic open dump. Learning was spread through traditional means and behavior modeling, with the approval of the community. (Zender 1999, 46.)

3.3 What Can Be Learned from These Examples?

While Vietnamese and North American Indian communities almost certainly differ from Ghanaian rural communities, there are universal lessons to be learned from them, especially concerning the role of self-organization, local culture and functioning of external actors.

The Vietnamese example emphasizes the importance of integrating new structures to the ones already existing in the community. To secure the sustainability of the SWM organization, new responsibilities and relationships that emerge should reflect prevailing types of organization.

The case of North American Indian communities emphasizes that the external actors who come and try to develop the community should adjust to the local culture and achieve a certain position in the community to effectively influence the community members. This presupposes a certain type of “uncertainty” from the external actors; while they may possess technical problem solving skills, the practical input should come from the local environment, culture and people.

The external actors should be able to recognize their own cultural presuppositions of terms such as “market” or “community” that might cause them to propose ineffective measures in that particular environment. Also, a certain holistic approach should be adopted, instead of the individualist utility maximization that is typical reasoning in Western societies.

In the context of West African countries there can be traditional beliefs that limit the spread of healthy sanitation practices. For example, in rural communities in Ghana the fear of being possessed by demons or losing magical powers can limit the use of public toilets (WaterAid 2009). These kinds of beliefs require respectful communication and framing new practices in local terms and ways of thinking.

In addition, when it comes to creating new institutions in the communities, creative thinking should be allowed to flourish in the communication. Experience will show what practices are effective and functional in that precise community. To achieve this kind of participatory learning, an open dialogue should be established in which ideas and concerns are freely communicated. The emerging problems should be approached through this same dialogue.

David Bohm has characterized dialogue as a process in which certain principles are respected (Bohm 1996, 18-22):

- 1) The group agrees that no group-level decisions will be made in the conversation.
An empty space should be formed where no-one is obliged to say anything, nor to come to any conclusions. This allows a free flow of discussion.
- 2) Each individual agrees to suspend judgement in the conversation.
If participants hear ideas they do not like, the ideas are not attacked.
- 3) As these individuals "suspend judgement" they are simultaneously as honest and transparent as possible.
New ideas are freely shared and concerns are openly brought up.
- 4) Individuals in the conversation try to build on other individuals' ideas in the conversation.

Ideas are constantly communicated and developed in the dialogue.

4 FRAMEWORK FOR DEVELOPING A COMMUNITY-BASED SWM SYSTEM

The framework is intended as a loose structure that guides the process of developing a community-based SWM system. It steers both external and indigenous actors to focus on key points that are crucial for an effective SWM system.

In his study Richardson presents six design principles for designing SWM systems that help “to account for the success of institutions in sustaining the physical works and gaining the compliance of generations of users to the rules-in-use” (Ostrom 1990, in Richardson 2003). For this study, these design principles have been slightly modified to reflect a different approach and also the differences between Ghanaian and Vietnamese communities. The principles are also considered an ingredient of the development process rather than strict rules.

4.1 Principle 1: Define the System

The waste management system should be defined as clearly as possible. The following questions should be explored:

What is actually managed, all waste or only solid waste? Who participate in the waste management system? What key factors of the community should be considered crucial for the functioning of the system? What is the relationship between the community and the local government? How do the practical efforts link to the wider context of development?

4.2 Principle 2: Imagine the Outcome

What is the desired outcome of a functioning SWM system, and what is required to achieve this? Proposed solutions should be in line with this goal, be cost-effective and make use of community effort and indigenous materials where available.

4.3 Principle 3: Engage in a Dialogue

Officials, external actors and community members are encouraged to participate in discussions concerning the waste management system and give feedback on its functioning. Waste management is considered a shared concern of the whole community.

4.4 Principle 4: Embrace Social Capital

The concept of social capital refers to the value of social relations and the role of co-operation and confidence to get collective results (Wikipedia 2012). In a community-based SWM system, social capital is preserved and made use of. This is reflected in e.g. funding systems that exclude the possibility of free riding, and in solving possible disputes openly in community meetings. Rather than considering SWM a technical system that requires “monitoring”, a more positive approach of everyday awareness should be applied.

4.5 Principle 5: Learn Constantly

Instead of viewing the development process to consist of separated technical solutions and capacity building efforts, learning and changing of practices should be understood to constantly alternate through dialogue. Developing waste management is a continuous effort by the community that constantly requires new ways of thinking.

5 CASE: AKROFU-XEVIWOFE, HO MUNICIPALITY, GHANA

To pilot the framework presented in this study, the community of Akrofu-Xeviwofe was chosen from three possible communities together with the Environmental Health Unit of Ho Municipal Assembly. The criteria used were:

- 1) Amount of social capital
Attention was paid to e.g. how the community handled general cleanliness, how functional the enforcement of rules was. There was also a lot of interest towards the project.
- 2) Current size and potential for growth
The community had to be big enough to be able to handle a more advanced SWM system in a structured way.
- 3) Distance from the city
This was important to consider so that the city of Ho and its services would not spread to include the community in the near future.

5.1 About the Community

Akrofu-Xeviwofe is a rural community in Ho Municipality, approximately 25 minutes drive away from the city of Ho. The authors have estimated the population to be 1000-1500 residents.

The main occupation in the community is farming. There are two schools and several churches. The water comes mostly from the Ghana Water Company, and there is also one community-maintained borehole.



Figure 12. Public places are generally tidy in the community.

Unit Committees are responsible for bylaw enforcement in the communities.

According to municipality officials Unit Committees are dysfunctional in Ghana. However, Akrofu-Xewiwofe has a functional Unit Committee. The members of the Unit Committee are elected by the community.

In the community solid waste is collected in two open dumps; one is an old sand pit and the other at the edge of the forest near the Junior High School. There are also several smaller dumps further away from the center of the community.



Figure 13. Communal open dump in Akrofu-Xeviwofe. On the left there is polyurethane foam insulation left over from a fridge.



Figure 14. There are smaller dumps further away from the community.

The community had built communal pit latrines (KVIP), but because of high ground water during the rainy season those facilities were replaced with water closets. Also, the number of private water closets has grown considerably. All of them use septic tanks to store the liquid waste; the waste is collected by a private company using septic tank trucks.

There is a cassava flour factory built and operated by 31st December Women's Movement; the liquid waste is directed to a ditch that takes the waste towards the surface waters.

There is also a health clinic that functions as an early childhood development center. Their waste (mostly needles and packaging waste) is collected as a pile behind the clinic, burned and then buried in a small pit. Occasional burning of waste also happens in other parts of the community.

There is haphazard metal recycling in the community. During the data gathering phase a metal dealer had come to the community to buy old fridges. The dealer had broken down a fridge, taken the metal and left the other materials to the community dump.

Straying of animals is usual in the community. Goats and chickens produce manure, but they also function as waste disposers when they eat leaves and fruit leftovers.

5.2 Interaction with the Community

Community discussion and a task force were measures that were carried out during visits to Akrofu-Xewiwofe in August 2011.

5.2.1 Community Discussion

The authors participated in community discussions in which the waste management project was introduced and discussed. The expertise of Mr. Hubert Doh, the Senior Environmental Health Officer, was utilized, as he knew about the

community practices and communication habits, such as first addressing the community elders. The Environmental Health Officers responsible for the communities were also present in the discussions.



Figure 15. Senior Environmental Health Officer, Mr. Hubert Doh, introducing the project to community elders. The discussion was in Ewe.



Figure 16. An informal planning meeting was held with some community elders after the community of Akrofu-Xewiwofe was selected. Mr. Richard Aghiabede, the head of Environmental Health Unit (on the left), also participated in the discussion.



Figure 17. A weekly community meeting was attended in which the pilot project was discussed publicly. The man standing acted as a chairman.



Figure 18. A community member raised concerns about waste-related issues.

5.2.2 Task Force

After the community meeting a task force of ten people was formed. The idea was to get a group of people to commit to the development of the community SWM.

The members' names and mobile phone numbers were written down; the phone numbers of the community's Environmental Health Officer and the two Sanitation Guards were also written on the list. The list was photocopied to the archives of Municipal Environmental Health Officer, Mr. Richard Aghiabede.

5.2.3 Locating the Landfill and Planning its Functioning

A planning meeting was held with the task force in which the possible landfill and community composting site was located and discussed. The area had earlier been used as an uncoordinated dump site. Initial planning was done through discussion with the task force concerning the walk routes and how the landfill would be filled and covered.



Figure 19. Planning the new landfill together with Richard Aghiabede and Frank, a community elder.

The best place for the compost in the new landfill site was selected based on shadiness and easy access from the road. Also the structure of the compost was discussed and it was decided to try pit composting, since a pit compost might keep the material more moist during the dry season compared to a compost pile.



Figure 20. Richard Aghiabede explains composting to task force members.

5.3 SWM System Proposals

Here are listed some practical proposals concerning the SWM system. The proposals should be considered as a starting point for a fruitful dialogue, not a definitive guide on how things should be done.

5.3.1 SWM Organization and Collection Scheme

A functional community-based SWM system requires some people to have an oversight of the system. This could be done via Community Sanitation

Representative(s) (CSR, see Figure 21) that is/are selected by the community in the community meetings; the job of the CSR would be to function as a community “manager” who is aware of waste and sanitation issues, knows about the functioning of the landfill and community compost and could be contacted in case questions or complaints arise. CSR would also be an active community organizer who works with different stakeholders (schools, churches, clinic, flour factory etc.), solving possible issues and organizing training and education. In the future CSR could also coordinate the efforts to build more sustainable toilet facilities compared to the current water closets.

CSR would also work in co-operation with the Environmental Health Officer of the Municipal Assembly. The presence of CSR also helps with the funding issue, which is problematic when it comes to the Municipal Assembly. The problem of EHOs not having the means to reach the community becomes less severe when one community member can be contacted instead with whom to plan sanitation and education of the community in case of e.g. municipal or national campaigns.

Also, through this new structure sanitation issues become more organized. In case NGOs are later coming to the community to organize sanitation issues, the CSR is the contact person for this.

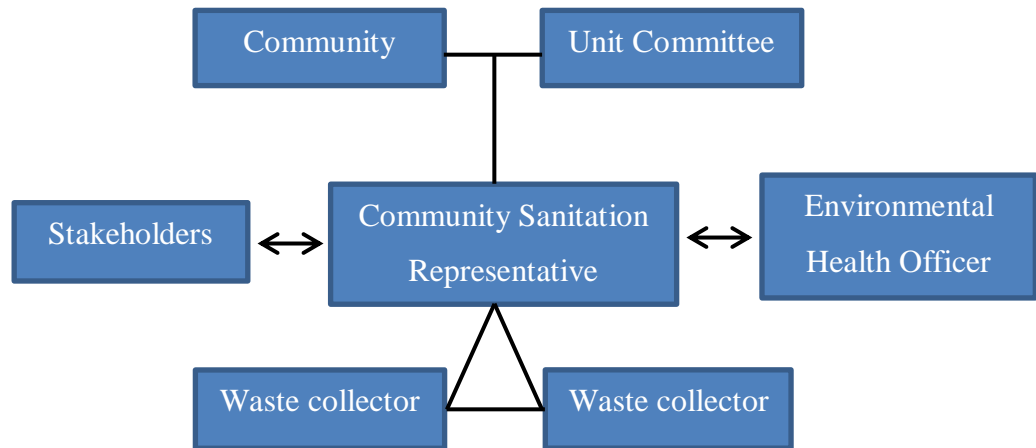


Figure 21. Structure for the SWM organization.

The functioning of the SWM organization is funded through community-wide taxes in order to avoid free riding and disputes. The CSR is paid a nominal sum for his/her efforts, and the waste collectors, if they are seen necessary, are paid for their work a sum that is negotiated by the community and CSR. The SWM organization handles waste-related matters such as collection routes or composting in their own meetings; however, matters that need community attention are brought to the community meetings to be publicly discussed.

The long-term sustainability of the system requires that it is self-sustaining when it comes to resources and financing; it is better to start slowly with only a few resources than try to speed up the development with external funding. Also municipality level funding should be restricted to a minimum, at least until the Municipal Assembly has a more functional funding structure. Independent efforts also build the conception of the SWM as a community effort.

The most probable case of starting the system is where no funding exists. In such a case measures that do not require funding should be carried out through community effort. In rural communities, also bartering should be considered as a viable payment option, at least in the starting phase. For example, can waste collection be funded by foodstuff such as flour or maize? If someone manufactures waste baskets, can they have free waste collection for a couple of months?

A mindset of “working for the common good” should be strengthened. Incentives can also be in the form of social reward, such as listing “community benefactors” or “honorary members of the community” on a public board.

The integration of the SWM organization with the WATSAN committees can be considered in communities that are dependent on their own water sources. However, the integration process should be allowed to take its own form so that confusion about responsibilities in the community and in Ho Municipal Assembly does not emerge.

The community should be seen as an independent organization instead of a subject of the Municipal Assembly which then seeks to impose sanitation policies on the community. Their relationship is built equal, which can be seen in how CSR and EHO work and learn together, transferring information and knowledge from and towards the community.

EHO’s work should focus on education, having oversight of the sanitation issues and guiding the efforts of the community, while CSR takes care of the functionality of the day-to-day operations of SWM.

Co-operation with Zoomlion should be considered in the future, for example in case the company extends its collection routes or starts collecting recyclables or hazardous waste.

5.3.2 Landfill Structure and Operation

The landfill layout should be planned so that different types of waste (such as various types of bulky waste) are piled in different places. The landfill should be easily accessible and structured so that residents do not have to walk through litter when waste is brought to the landfill.

If organic waste is piled in large amounts, airless conditions can cause methane to form in the pile, which can easily ignite waste fires inside the pile. To avoid this phenomenon, simple gas wells that guide the methane out of the pile can be constructed. For example rocks, pieces of bricks and bamboo trunks can be used

for this purpose. However, composting is the recommended way of handling organic waste.

Usually large-scale sanitary landfills have bottom structures to collect leachate (water that goes through the waste) and to avoid soil pollution. Nonetheless, such structures are costly and thus they cannot be applied to Akrofu-Xeviswofe.

However, a basic review should be done: where does rainwater flow naturally?

Drains can be dug to direct the water flow away from buildings and yards. If water starts to accumulate in the landfill, drainage can be built using for example bamboo trunks.

The landfill does not require personnel to be present all the time. However, clear signs should be made to show where the different kinds of wastes (mixed waste, organic waste and hazardous waste) go to in the landfill. A local painter can be recruited to paint simple signs with pictures.

The landfill site should be fenced to delimit the area and avoid straying animals to access the waste.

It should be explored whether waste needs to be spread and covered. Covering the waste with plastic sheet (sewn from water sachet bags, for example) and soil could prevent the forming of leachate water in the waste pile. Spreading the waste prevents stagnation of water.



Figure 22. Palm fence that can be used to mark out the limits of the landfill.

5.3.3 Community Compost

In the beginning, pilot composting could be done in a community pit located in the landfill site to ensure efficient learning. The nearby school could manage the compost and use it as an education tool for ecological and agricultural practices. To test and learn the proper composting practices, only limited amounts of organic waste should be composted in the beginning. (See Appendix 1 for practical guidance for how to build a pit compost.)

Collecting chicken and goat manure and composting it should be considered; however, this requires the animals to be mostly inside fenced areas.

The end product of the community compost should be used in community applications such as the school garden. The use of the end product of other composting efforts should be decided on a case by case basis; for example, there can be household composts and neighborhood composts which are shared by a couple of households.

5.3.4 Waste Collection Equipment

If waste collection is deemed necessary, locally made baskets can be used; they can be made as big as necessary.



Figure 23. A basket made from palm leaves that could be used to store and transport waste.

To make litter collection easier, waste pickers could be made from bamboo sticks that have a nail at the end. The collection equipment could also be designed from wheelbarrows. HMA had several unused tricycles around its compounds; it should be explored if these could be made use of in the rural communities.

Waste collectors should be equipped with protective gloves and respirators in case the conditions are dusty, such as when the waste pile is spread. In the future they could also be provided with easily recognizable uniforms.

5.3.5 Education in Schools and Community-Wide

Education should be carried out through emphasizing positive benefits of functional sanitation for the community in everyday life instead of focusing on

“wrong” practices on an abstract level (using terms such as climate change or sustainable development). Learning is best achieved when the local language is used by local actors; both are provided with the same value system, which makes communicating and framing the benefits in local terms easier.

Good sanitation should be made something for the community to be proud of.

Community co-operation and sharing of know-how should be increased.

Sanitation competitions between communities (such as “the cleanest community”) can be considered, but they should be included in other municipality level activities; also, they should have a positive tone and not include too much work.

Environmental education could be arranged as part of community celebrations and events such as masses and services of worship. They should include practical, down-to-earth advice and a “do it yourself” approach, like reusing waste material creatively or building a compost.

Schools could have public exhibitions where e.g. toys or jewellery are made of waste material. They could also prepare musical performances about sanitation and recycling for community events. If there is a tradition of preparing plays, they too could be harnessed for this purpose.

5.3.6 Recycling Possibilities

CSR could also be the organizer for community-wide recycling efforts. For example metal waste could be collected to a pile; after a few months CSR could call a local metal dealer and ask him to pick up the waste. The income could be used to run the SWM system.

5.3.7 Composting Dry Toilet as a Toilet Solution

It is likely that the Environmental Health Unit will start promoting the use of the composting dry toilet model in the community. However, the funding for the building of the facility should come from the community to secure long-term functioning and local “owning” of the facility.

Operating the communal dry toilet in a collective manner requires a functional SWM system, since the upkeep of the facility and the use of the products need to be discussed.

5.4 Reflecting on the Design Principles

The design principles introduced in Chapter 4 can be seen functioning in Akrofu-Xewiwofe in the following ways:

- **Principle 1: Define the System**
Visits were made to the community, which helped forming a clear picture of the underlying challenges and potentials. The current state of waste management practices was reviewed. The SWM system is defined to include all the community members instead of only those willing to pay for the service.
- **Principle 2: Imagine the Outcome**
A mental image was formed of a functional SWM system. Community effort and indigenous materials (such as baskets and bamboo) are used where possible. In the beginning the SWM system focuses on functional disposal of solid wastes and composting but over time effort is put also on recycling and reusing materials.

- Principle 3: Engage in a Dialogue
All participants, including external actors and municipality officials, engage in conversations concerning the current state and the future of the SWM system.
- Principle 4: Embrace Social Capital
Social capital is preserved when the community is fully engaged in the process and funding structures prohibit free riding.
- Principle 5: Learn Constantly
All participants approach the process openly and are able to take feedback from different actors. The benefits of the system are processed in the dialogue.

However, since the pilot project is just beginning, principles 4 and 5 are still taking form on the practical level.

5.5 Benefits of Functional SWM

For an SWM system to be legitimate, its benefits need to be effectively understood and communicated. They can be divided to three categories: environmental and health, economical, and social.

Environmental and health benefits include:

- Solid waste is placed in one site, which means the possible harmful effects (such as rodents or odours) are also limited to that site.
- Proper covering of the waste means less stagnant water for mosquitoes to breed.
- Limiting burning of waste can decrease health problems related to air pollution such as the risk of cancer and outbreaks of asthma, nausea and headaches (California Environmental Protection Agency 2003). These symptoms can be especially harmful to children and elderly people.
- Limiting straying of animals on the landfill can reduce bioaccumulation of harmful substances (such as heavy metals) to them, which means that they are safer to eat. (Encyclopedia of Earth 2010.)

Examples of economical benefits are:

- Separated waste fractions in a landfill enable uses such as composting biodegradable waste and easy reuse of materials
- Recycling materials such as metals can provide an income stream for the community.
- Composting biodegradable material can provide the community with nutritious soil that is moist for a long time and can be used to replace artificial fertilizers.
- Unpolluted environment is open for new uses; for example ground water use may be increased in the future.
- New businesses can be developed based on reuse of materials.

Social benefits of SWM include:

- Community based organization (CBO) clarifies the responsibilities concerning waste inside the community; this is likely to reduce disputes over open dumping and burning of waste.
- CBO increases community-wide coordination and co-operation, which can be useful in future community projects.
- CBO builds the independence of the community, which enables it to function as a self-sufficient actor that works in co-operation with the local government.

5.6 Possible Challenges

Organization-wise (both inside the community and between the local government and the community) the challenges that are faced are the ones mentioned in Chapter 2.5: 1) Confusion about responsibilities and management, 2) Lack of coordination and co-operation and 3) Absence of systemic approach. These issues should be approached through engaging in a dialogue (as stated in Principle 3) in which concerns can be openly discussed. These dialogues should be conducted also inside the municipal organization.

5.6.1 Private and Community-Level Motivation

A major goal to motivate the development of SWM systems is to strengthen common responsibility, instead of imposing responsibility solely on the community or the local government. To ensure and sustain motivation to run the SWM system, emphasis should be put on the dialogue process in which participants seek to understand and communicate the benefits of the SWM system in local and practical terms. In the beginning, the focus should be on honored community members in particular.

An equal relationship between the community and the external actors should be established. For example, in Ghana old notions can prevent effective feedback, which in turn results in ineffective SWM solutions. Practically, this traditional hierarchy can be dissolved through equal communication.

5.6.2 Sustainability of Funding

Often the lack of systemic approach - not money - is the primary problem when designing SWM systems. In case the lack of funding comes up in the dialogue, a counter question should be asked: What can be achieved without money? What are the most effective means to improve SWM in case there are currently no sources for funding?

Exploring these questions can provide actors with new approaches that both help solving problems without external funding and finding possible (internal or external) funding sources.

Use of external resources may result in an SWM system that becomes dependent of such resources. For example excessive external investment on technological solutions has been discovered to result in unsustainable systems; if there is no proper adoption of a project as “family property”, the results tend to be short-lived (Hofstede et al. 2010, 418). External funding and experts should play a minor role in the process. The role of the external actors should be limited to giving input on how to develop the systems and provide feedback on the development process.

5.6.3 Resistance to Change

Attitudes towards change may be the hardest things to change. This can also be observed in companies that seek to renew their corporate culture; when change is forced from the top, it tends to become a passing fad - a “Flavor of the Month” - that is difficult to sustain (Senge et al. 1999, 6).

Old prejudices die hard, and they may in turn induce political measures and systems that undermine the actual capacities of people. These thoughts should be brought up and processed in the dialogue.

Also learning from mistakes should take place in case there have been development projects earlier on that have failed to produce long-term results. The dominant approach to development has rarely recognized the need for local integration; instead, economic models have dictated policies, causing extensive focus on transferring money and technology. This, in turn, has resulted in projects satisfying the donors’ objectives more than the receivers’ objectives. (Hofstede et al. 2010, 418.)

6 CONCLUSIONS AND PROPOSALS FOR FURTHER DEVELOPMENT OF THE SWM SYSTEM

This study has presented a practical framework for how a community-based SWM system can be initiated, what benefits it has, what kind of challenges can emerge and how they can be overcome. However, it should be emphasized that new practices cannot be forced to a community just as they cannot be forced to individuals; the recipients must have a will to learn before development can take place.

The design principles proposed in this study can serve as a valuable tool for initiating a community-based SWM system. Nonetheless, they should not be approved uncritically, but instead taken as a starting point for discussion and collective processing.

The SWM system requires practical piloting that will be carried out in Akrofu-Xeviwofe, starting in May 2012. Through the piloting, the following aspects are to be reviewed:

- Do the design principles effectively cover the various issues faced in initiating an SWM system in a community?
- What feedback will the community give regarding the SWM organization proposal? Are there already some people working as “community managers” who could also start managing the SWM organization?
- What kind of behavior can help overcome the challenges that the process faces?
- What is the most efficient composting method for local needs?
- What is the detailed design and management scheme of the community landfill?
- How much recyclable materials are there?

During the pilot phase, research should be carried out concerning the functionality of the system and on how it could be improved: for example, major sources of hazardous waste could be explored and proposals could be made for their best

disposal available. It should be reviewed how the SWM framework and design principles could be made use of in designing an SWM system also in a city area. Duplicating the system in other communities is to be considered.

The co-operation between local government, communities and Zoomlion could be enhanced; a transfer station from which waste is transported to the municipal sanitary landfill could be a long-term SWM solution. However, the condition of roads can inhibit this process in more remote communities.

The validity of the framework should also be considered in initiating and developing systems in other fields such as business, financing or education.

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APPENDICES

APPENDIX 1. Composting Guide.

APPENDIX 1.

Composting Guide (Laukka 2009).

Pit Compost

- Make a pit for example with depth of 50 cm and width of 50 cm. It can be easier to dig and fill small pits, but also larger ones will do.

- Fill the pit with organic waste (kitchen waste, garden waste).

- The pit can be filled with kitchen waste and/or garden waste.
- When using both kitchen and garden waste, the pit can be filled for example in layers. First layer is kitchen waste (at least 10 cm). Second layer is garden waste (about 5 cm), followed by a layer of soil (about 5 cm). The waste layers are put in until the pit is full.
- Cover the waste always with soil to prevent bad smells which could attract animals.

- Depending on the soil type and weather conditions, it takes about 3 months for kitchen waste to decompose. If the pit is filled only with garden waste, it can take about 6 months until the compost material is ready. Thus compost is ready to be used as a fertilizer after one can not recognize the original waste. End product should be dark brown fertile soil.

- Trees can be planted straight on top of the pit or compost manure can be removed and used elsewhere in the garden to grow vegetables.

- After dealing with waste, one should always wash hands.

Benefits of Compost

Plants grow better in compost soil. Compost also helps to maintain the soil fertility. It contains important plant nutrients (like nitrogen, potassium and phosphorus) and can also contain beneficial minerals. Compost helps the soil to retain nutrients and water, reducing the need of chemical fertilizers.

What to Compost

Suitable for Composting

Kitchen Waste

- vegetable and fruit waste, peelings
- tea grounds
- leftovers
- egg shells
- nut shells (big shells should be chopped)
- paper napkins

Garden Waste

- hay or straw
- leaves and grass clippings
- twigs, thin branches
- weeds and other garden waste

Can Be Composted in Small Amounts

- paper
- milk products
- high fat foods
- meat products
- small bones
- diseased plants

Not Suitable for Composting

Materials That Do Not Decompose or Can Spoil the Compost

- ash
- metals
- plastic and plastic bags
- glass
- rubber
- leather
- chemicals, oil, gasoline
- medicines
- batteries