KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY,

KUMASI-GHANA

PUBLIC - PRIVATE PARTNERSHIP IN FAECAL SLUDG COLLECTION AND TREATMENT IN ASHANTI REGION OF GHANA

BY

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DECLARATION

I hereby declare that, except for specific references which have been duly acknowledged, this project is the result of my own research and it has not been submitted either in part or whole for any other degree elsewhere.

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DEDICATION

To the glory of God Almighty, this Thesis is dedicated to my family especially my husband, Joseph K. Danso, my beloved children, able supervisors and all my able lecturers at the materials engineering department, knust.

May God Almighty bless them with long life, prosperity and good health,

Amen.

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ABSTRACT

Importance of good sanitation is indisputable because it is a crucial stepping stone to better health. It offers the opportunity to save the lives of many children who would otherwise yield to diarrheal diseases and to protect the health of many more. It is fundamental to gender equity because it protects women's dignity. Appropriate management of faecal sludge, a component of sanitation can never be left out in this contest.

This study therefore seeked to assess public-private partnership in faecal sludge collection and treatment in Kumasi Metropolitan Assembly and Asante Akim North Municipal Assembly in Ashanti region of Ghana.

The study was based on desk study and interviews. The key informants provided information on the management and operations of collection and treatment system of faecal sludge in the selected areas. The study revealed the method used in collecting faecal sludge from households and public toilet in Kumasi Metropolitan Area which included the use of vacuum suction trucks and manual collection truck undertaken in partnership with private operators and the Assembly, whereas Asante Akim North Municipal Area, only vacuum suction trucks were used in faecal sludge collection which was solely done by the Assembly. Seven public institutions and twenty-three (23) private companies were identified to be involved in the collection of faecal sludge in the Kumasi Metropolis at the same time, Asante Akim North Municipal Area; the Assembly owns two trucks for collecting faecal sludge in the municipality with no private hand involvement.

The study revealed that, 77% of faecal sludge disposed off at the treatment site in the Kumasi metropolis is done by the private companies. However, the Assembly seeks to regulate the activities of all private companies within the metropolis.

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LIST OF ABBREVIATIONS

AANMA	Asante Akim North Municipal Assembly (Area)
As	Assembly
BOOT	Build Own Operate Transfer
BOO	Build Own Operate
BOT	Build Operate Transfer
EAWAG	Swiss Federal Institute for Environmental Science and Technology
FS	Faecal Sludge
FSG	Faecal Sludge Generation
FSTP	Faecal Sludge Treatment Plant
GoG	Government of Ghana
JMP	Joint Monitoring Programme
KNUST	Kwame Nkrumah University of Science and Technology
KVIP	Kumasi Ventilated Improved Pit Latrine
KMA	Kumasi Metropolitan Assembly (Area)
MMA	Metropolitan Municipal Assembly
MDG	Millennium Development Goal
MLGRDE	Ministry of Local Government and Rural Development
PPP	Public- private partnership
PO	Private operator
WC	Water Closet
WHO	World Health Organisation
WMD	Waste Management Department

CHAPTER ONE

INTRODUCTION

This chapter presents the background to the study, problem statement, the study objectives and questions, justification and finally the scope and limitations to the study.

1.1Background

Importance of good sanitation is indisputable because it is a crucial stepping stone to better health. It offers the opportunity to save the lives of more than1.5 million children a year who would otherwise yield to diarrheal diseases and to protect the health of many more (WHO/UNICEF, 2012). It is fundamental to gender equity because it protects women's dignity. Also, it is a key to economic development since investment in sanitation protect investment made in other sectors, such as education and health resulting in cost effectiveness (WHO/UNICEF, 2012). According to current Global statistics; certain countries are not on track to meet the MDG sanitation target because in 2010, an estimated 2.5 billion people were still without an improved sanitation including 1.2 billion who have no facilities at all especially in Sub –Saharan Africa and Asia (WHO/UNICEF 2012) line with this there have been several efforts by the Government of Ghana (GoG) to improve the sanitation situation in urban and rural areas of Ghana especially in the urban areas where population growth keeps on increasing. In Ghana, including Kumasi metropolitan area and Ashanti Akim North Municipal area, an improved sanitation coverage is about 15% in urban and about 6% in rural areas as well as 60% coverage for the shared facilities (WHO/UNICEF, 2012).

Tema and Akosombo towns are substantially sewered with Accra and Kumasi being partly sewered. Since the majority of urban households and public depend on on-site sanitation facilities, a lot of faecal sludge is generated making faecal sludge management difficult and more cumbersome for the state alone to manage. Therefore; there is the need to include the

private partners in the collection and treatment activity (Thrift, 2007). In most developing countries including Ghana, public- private partnership(PPP) has become the leading concept for managing sanitation systems in both urban and rural areas especially in the area of collecting and treating faecal sludge (Kathy, 2005).

The introduction of private sector management in faecal sludge collection and treatment in several cities in Ghana has guaranteed a general improvement in their standard of services offered but the situation is far from satisfactory. There are number of factors accounting for the lapses in the PPP scheme in faecal sludge collection and treatment in Ghana (Antwi-Adjei, 2009).

This study seeked to investigate the rationale for the PPP in Kumasi Metropolis and Ashanti Akim North Municipal Area, factors accounting for the lapses in the PPP scheme in faecal sludge collection and treatment and to compare how PPP works in the two study areas as well as determining the level of performance of both actors in the PPP scheme.

1.2 Problem statement

Most people in Ashanti region do not have access to a hygienic toilet; large amounts of faecal waste are not adequately treated before disposing into the environment. This is likely to cause human excreta-transmitted diseases like diarrheal diseases, cholera, typhoid, hepatitis, polio, ascariasis, etc., that predominantly affect children and the poor (Thrift, 2009). The situation in Kumasi Metropolitan Area and Ashanti Akim North Municipal Area are no different. However, effective management of faecal sludge in Ghana including Ashanti region requires a combine effort of both the state and the private sector participation in order to curtail the problems associated with faecal sludge management. This is because public sector domination in the provision of water and sanitation in Ghana has been held responsible for the awful state of these services. It has been argued that public enterprises have been

characterized by the absence of competition, low levels of government investment, and lack of service expansion resulting in inefficiency and lack of pricing mechanisms to reflect service cost and meet public demand (Thrift, 2009).

On the other hand, the past few years, therefore, have witnessed an increase in private sector participation in urban water and sanitation provision in Ashanti region. The rationale behind involving the private sector is to cut the size of the public sector in search of new technologies and expertise and gain access to increased capital and greater economic efficiency to improve operations and to generate revenue. Nonetheless, there is lack of understanding of the roles of partners managing faecal sludge collection and treatment, as well as best way to engage private operators for sustainable and improved faecal sludge collection and treatment in Kumasi metropolis and Ashanti Akim North Municipal area.

1.3 Justification

The study helped to ascertain whether the current PPP scheme in faecal sludge collection and treatment was yielding the anticipated results. A good understanding of the PPP scheme in faecal sludge collection and treatment would help to improve further designs which involve PPP in other section of faecal sludge management and as well serve as a replica to other Metropolitan and Municipal areas. Also, the study would enable readers to compare how PPP works in both Kumasi Metropolitan and Ashanti Akim North Municipal areas.

Finally, findings from this research would inform city authorities in their policy formulation and decision making processes on faecal sludge collection and treatment.

1.4 The main objective

The main objective of this research is to assess public-private partnership in faecal sludge collection and treatment in Kumasi Metropolitan Area and Ashanti Akim North Municipal Area.

1.5 Specific objective

- To determine faecal sludge collection and treatment approaches and quantity of faecal sludge collected and treated in each study area.
- To determine the role of public and private sector in faecal sludge collection and treatment.
- To examine factors that affect PPP in faecal sludge collection and treatment in the study areas.

1.6 Research questions

- How has the use of PPP provided adequate facilities for faecal sludge management?
- Has the use of PPP increase the quantity of feacal sludge collected and treated in the study areas?
- What is the role of public and private sector participation in faecal sludge collection and treatment?
- What are the factors and conditions that affect performance of PPP in the collection and treatment of faecal sludge?

1.7 Scope and limitation of Study

The study was limited in scope to Kumasi and Ashanti Akim North Municipal Areas in the Ashanti region of Ghana. This limitation was a purposeful attempt to make the research manageable considering the time and resources available to complete it. The study is focused on PPP in management of faecal sludge solely on collection and treatment and to examine faecal sludge collection rate and the role of public and private sector in faecal sludge collection and treatment. It involved the determination of factors and conditions that affect performance of PPP in the collection and treatment of faecal sludge (political, legal, socio cultural financial and technical). The study is limited only to the study of PPP in the collection and treatment of faecal sludge.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

This chapter contains findings of the review of secondary sources of data relating to the research topic.

2.0 Technology options for faecal sludge collection

2.1 Vacuum suction trucks

According to Michael et al, (2009), the conventional method for pit emptying is the vacuum tanker (vacuum suction truck). This is a truck-mounted tank between 1 to 10 m^3 in capacity but in most part of Ghana 5m^3 incapacity type is mostly used with a vacuum pump connected to the tank to suck out the sludge. Technical limitations however exist to the use of the vacuum tanker in areas with inadequate road access, shortage of spare parts and fuel (Michael et al, 2009).

Manual emptyingz

On the other end of the technological scale, manual emptying is common globally especially in many areas in the sub-Saharan Africa (WUP, 2003). Manual emptying usually involves accessing the pit, which in some cases done by destroying the squatting slab and digging the sludge out with simple hand tools such as spades, shovels and buckets by a team of workers, sometimes borrowed or rented from the customer. If the sludge is liquid, buckets and rope may be used to scoop the sludge out (Eales, 2005). This method is usually discouraged, however, primarily due to the pathogenic nature of the sludge and the undesirable nature of the work (Michael et al, 2009). In Kibera, Nairobi, manual emptiers are subjected to violence and extortion (ibid); the practice is illegal in many African countries. (Parkinson and Quader, 2008). Despite this, it is still one of the most common practices of emptying pits.

Other emptying technologies

Given the great difficulties in some urban areas to access toilet pits and septic tanks through narrow lanes and backyards, emptying technologies were developed, which allow pit emptying under such circumstances (Michael et al, (2009).

According to Strauss and Montangero (2002), Manus Coffey, an Irish manufacturing firm, developed a 1-m3 vacuum tanker (.mini tanker.) in the 1980s. The vehicle is widely used in Eastern and Southern Africa by private and public emptying services. They further observed that it is uneconomic for such small tankers to haul their load to the designated discharge or treatment site after each emptying. Hence, the attempt by the municipal emptying service of the City of Maseru, Lesotho, to develop a system of sludge trans boarding between the mini tanker and a conventional-size vacuum tanker on a road nearest to the congested area served by the mini tanker (Strauss and Montangero, 2002).

Photos 3 and 4 show the mini tanker emptying and FS transfer 1

Fig. 2. 1 Mini-Tanker Closing Up to A Latrine Tanker to a Standard-Size Vacuum

{Source: Strauss, and Montangero, (2002)}

Fig.2.2 Transboarding of FS from a Mini-Tanker (Maseru, Lesotho) for Emptying (Maseru,

{Source: Strauss, and Montangero, (2002}

According to Michael R. et al, (2009), the Sewer and Drainage Company of Haiphong (N. Vietnam), a public utility enterprise, is responsible for septage collection. Collection is carried out with vacuum tankers and small vacuum tugs for areas difficult to access, used together with intermediate-storage tanks mounted on a hook-lift truck. The mini-vacuum-tugs

(Vacutug) were developed by the company in collaboration with a local manufacturer (Michael et al, (2009).Strauss, and Montangero, (2002) also add that the Vacutug is a newer development of the mini-tanker produced by Manus Coffey from Ireland. They have a capacity of 350 L and cost around $ 4,000. The combination of large and small equipment has proven successful and almost 100% of the houses can be covered.

A picture showing a mini tug and a storage tank, which can be hook lifted and hauled away (Strauss, and Montangero, (2002).

Figure 2.3:Haiphong made mini vacuum tug (350 L) for narrow lanes, used together with a Intermediate-storage tank placed in the nearest accessible road.

{Source: Strauss, and Montangero, (2002)}

{Source: Strauss, and Montangero, (2002)}.

Manual Desludging Hand Pump (MDHP)

According to Strauss, and Montangero, **MDHP** was developed by the London School of Hygiene and Tropical Medicine together with Oxfam in Indonesia (Strauss and Montangero, 2002). Apart from the MDHP, other equipment stipulated by Oxfam (2008) includes one bucket (minimum 50 litres), fibre bags if possible, a hoe and shovel and protective equipment.

Figure 2.4: The MDHP

[Source: Oxfam (2008)]

Mapet – Hand-Powered Pit Emptying Technology

As stated in Muller (1997), Mapet stands for Manual Pit Emptying Technology, a low-cost, decentralised emptying technology developed by WASTE in collaboration with the Dar es Salaam (Tanzania)Sewerage & Sanitation Department, pit latrine emptiers (scavengers), local leaders and technicians, and residents in the late eighties/early nineties (Muller, 1997). According to (Muller, 1997),the project comprised the technical as well as organizational development of a locally adapted and rooted technology enabling the traditional scavengers to depart from their humiliating and risky job of having to enter latrine pits for scooping out the faecal sludge (Muller,1997). Further to this, the new emptying option came in response to the inaccessibility of many residential areas by normal vacuum tankers; the inadequacy of the municipal emptying service organisation, and the non-affordability of emptying prices charged by the municipality (Strauss, and Montangero, 2002).

MAPET equipment comprises a hand pump (activated by a manually driven flying wheel), a 200 litre vacuum tank (both mounted on a pushcart), flexible hose pipes, and a mixing rod.

Fig.2.5 MAPET equipment

{ Source: Strauss, and Montangero, (2002)}.

The Vacutug, MAPET and MDHP have all been promising technologies in one way or another although none have been proven on a large scale (Strauss, and Montangero, (2002). The table below provides a comparison of the advantages and disadvantages of different methods of emptying.

Table 2.1: Advantages and disadvantages of various methods of pit emptying

Vacuum tankers	
Advantages	**disadvantages**
Removes waste safely for both workers and public health	Haulage distances are likely to be key in overall expenditure
It is a low odour technology	Costs too much for many SSIPs
Fastest means with which excreta can be exhausted	Access problems in many areas
Relatively fast travelling speeds has better possibility of economical disposal of waste	Maintenance costs are also high due to Maintenance costs are also high due to imported technology
The Vacutug	
Removes waste safely for both workers and public health	Slow max speed means localized emptying point such as sewer or tank are needed
It is a low odour technology	Costs too much for many small scale independent providers (SSIPs)
Faster to empty than either manual or manually driven mechanical systems	Is having some access problems in Kibera, Nairobi, despite its small size
Reduces social stigma on workers	Maintenance costs are potentially high
Manual Desludging Hand Pump	
Low cost when compared to other technologies, so suitable for SSIPs	Requirement for further containerization and safe disposal of waste
Possible to produce locally in many areas	Could still produce unpleasant odours
Facilitates access into even very densely populated areas	May be difficult to operate on thick sludge or low volume installation
Low operation and maintenance costs	
Manual emptying	
Services accessible to community	High unit cost of removal
Relatively cheap to keep latrine operational	Significant health risks to workers
Low equipment capital cost	Rarely acceptable to municipalities and so not regulated
	Associated with indiscriminate dumping
	Lack of appropriate equipment means spillage regularly occurs
	Will often require the slab of the latrine to be demolished to facilitate access, subsequently increasing householder cost

*[*Source: Michael R. et al, (2009)*]*.

Challenges in faecal sludge collection

In order to develop a technology that will address the challenges in faecal sludge collection, Still, (2002) suggests that certain design criteria should be fulfilled. Some of the important criteria that he thinks needed to be considered are described below.

Access

Access is one of the main reasons why manual emptying is so common. Large vacuum tankers are simply unable to traverse the narrow streets in unplanned settlements. Although longer hoses can be used, the maximum length possible is approximately 50 m (Still, 2002) and adds to the cost of emptying. Even the Vacutug, designed with accessibility in mind, is unable to access some of the narrower paths in Dhaka, Bangladesh, and some other developing country where this technology is used (Parkinson and Quader, 2008). The MAPET has a small width of 800 mm, but there was difficulty in navigating the poor roads due to its tyres. On the other hand, at 2 kg in weight and approximately 2 m in height (Oxfam, 2008), the MDHP appears extremely portable and easily moved around (Michael et al, (2009).

Effective means of emptying faecal sludge

According to Harvey, (2007), Vacuum-based technologies have experienced difficulties with various kinds of sludge. Vacuum pumps are unable to deal satisfactorily with dry sludge or solid objects like stones, sticks and other rubbish (Harvey, 2007). This is because the vacuum system depends on the material pumped behaving as a fluid (Hawkins, 1982). Thus density of sludge is an important criterion, though often water is added before emptying starts. Water is often short in supply in low income areas (Michael et al, 2009).

The technologies are only able to empty to a limited depth. A vacuum tanker can lift a depth of up to 2 to 3 m (Pickford and Shaw, 1997); the Vacutug cannot empty pits more than 2 m deep (Parkinson and Quader, 2008); the MAPET has a maximum pumping head of 3 m (Muller and Rijnsburger, 1994); the MDHP only reaches 80 cm down the pit (Oxfam, n.,d.), this also depends on the density of sludge.

Hawkins, (1982) observed that, the higher the density of sludge, the greater the static head required. Other importance considerations are that pit depths can vary widely, there may be the need to empty the pit completely to function acceptably, and it may be unaffordable for users to empty more than a limited amount of sludge at a time (Hawkins, 1982).

Operation and maintenance

According to Building Partnerships for Development (BPD, 2008)Operational and maintenance is crucial to the sustainability of the pit emptying technology, in particular, the affordability and availability of spare parts, power source and regular servicing (BPD, 2008). BPD, (2008) testifies that, there are many cases of pit emptying machines failing or deteriorating due to the inability of the users to find replacement parts. Vacuum tankers are a classic example in this respect because of the high reliance on imported fuel and spare parts. Building Partnerships for Development (BPD, 2008) cited the foreign component as part of the reason why MAPET, even though it was locally manufactured, is no longer being used in Dar es Salaam. When the foreign part broke down, it could not be replaced or substituted by local parts (BPD, 2008).

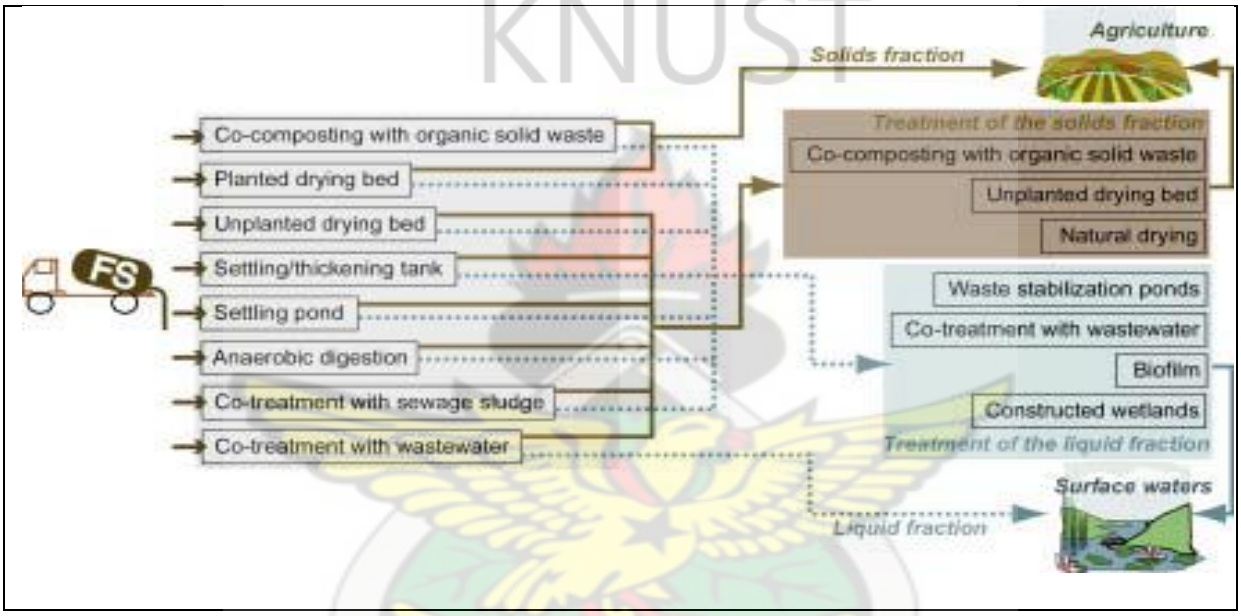
Treatment technology options

According to Montangero and Strauss (2004), the choice of a FS treatment option depends primarily on the characteristics of the faecal sludge (FS) generated in a particular town or city, budget availability, land availability and on the treatment objectives (Montangero and Strauss, 2004). The widely varying quality and quantity of FS requires a careful selection of appropriate treatment options. Primary treatment may encompass solids liquid separation or biochemical stabilization if the FS is still fresh but has undergone partial degradation during on-plot storage and prior to collection.Fig.2. 6 provides an overview of options for faecal sludge treatment, which can be implemented by using modest to low-cost technology, and which therefore carries a high potential of sustainability. Proper FS treatment, either in

combination with wastewater or separately, has been practiced in a few countries only to date (e.g. China, Thailand, Indonesia, Argentina, Ghana, Benin, Botswana, and South Africa).

Treatment options used or proposed comprise batch-operated settling-thickening units; unplanted and planted sludge drying beds; non-aerated stabilization ponds; combined composting with municipal organic refuse; co-treatment of FS in wastewater treatment plants.

Fig 2.6 summary of potential, modest-cost treatment options for faecal sludge



Source: Strauss and Montangero, (2002)

The first stage of FS treatment mostly involves separation of solids from the liquid. The liquid part can be treated using different wastewater treatment options while the solids can undergo co-composting or natural drying process for agricultural reuse or land filling. Depending on the treatment objectives and the prevailing conditions the best options can be chosen for a selected area.

Faecal Sludge generation

According to Heinss *et al.* (1998), determining the quantities of faecal sludge is an essential and fundamental step in the planning and design of collection, treatment and disposal

facilities just as with wastewater. Reliable data on faecal sludge quantities are needed if the facilities are to be designed properly with adequate capacities (Heinss *et al.*1998).

Public and private partners in emptying and treatment services

The private sector enterprises provide emptying (collection) and treatment services to complement the services provided by the public partners in faecal sludge management in most developing countries (Parkinson et al, 2008).

Moreover, the local authorities (public) in most African countries are responsible for conventional vacuum tanker services and larger scale infrastructure such as transfer stations (Eales, 2005). Provision of transfer stations and their reliable operation is necessary for the success of private enterprises. There is increasing acknowledgment of the role private enterprises can play in the pit emptying market (Bongi and Morel, 2005; Scott, 2006), though lesson learnt from solid waste management suggests that municipal governments often fail to provide such systems (Mansoor, A. 2009).

In most African countries where there are treatment plants, private companies often take charge in the treatment of faecal sludge in partnership with the assembly for the purpose of improving sanitation in the developing world (Thrift, 2009).

To facilitate the entry of private partners into the market, the cost of pit emptying must be affordable and the external environment must be supportive. Besides the capital cost, there are the long-term operating costs, such as fuel, permits, haulage, disposal, cleaning, spare parts and maintenance (Eales, 2005). This is an area where engineers and business specialist must learn to work together.

2.3 Background on partnership

Partnership as a term has been used generally to depict many different types of relationships. The relevant definitions pertaining to this study are discussed below. Graas *et al* (2007), defines partnership as an agreement between two or more partners to share knowledge, skills and responsibilities in order to achieve, through synergy, a common objective, a better position and/or economies of scale. They further explain that, the general benefit of partnerships is the synergy; the combination of strengths of the different partners and with this synergy more can be achieved together. Murray et al, (2003) moreover defines partnership as a legal relationship formed by the agreement between two or more individuals or organizations to carry on a business as co-owners. To them, there is no requirement to register a partnership with the state, but stressed on the need to use a partnership agreement to clarify the relationship between the parties.

2.3.1 How partnerships work

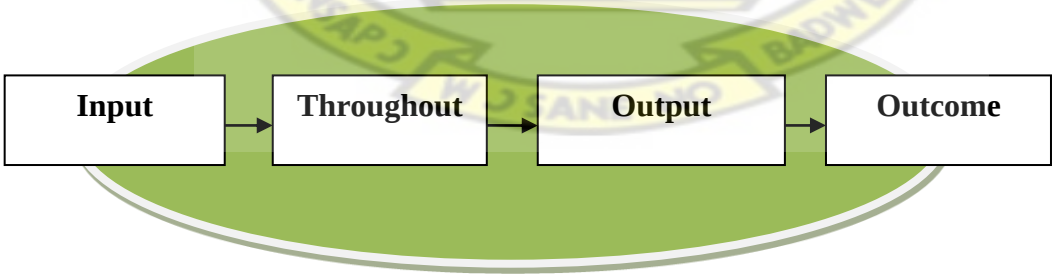
For any partnership to be successful in its implementation there is the need to develop sound agreements between the various actors. It must be noted that even before the agreement there is the need for an enabling environment to back the partnership formation. These enabling environments according to Mcquaid, (1994), comprise the need for regulation, policy principles and implementation of guiding principles to help direct the partnership procedures. To build a continuous partnership there is the need for comprehensive legislative framework which should spell out the roles of the public as well as that of the private sector in their relationships. Antwi-Agyei, (2009) reports that the participation of private sector in the collection and treatment of faecal sludge enhances cost-effectiveness in partnership operations, thus protecting the interests of the parties involved. According to Pongsiri (2002) partnerships require an effective bylaw which should be based on a stable and trusted system of enforcement of such laws concerning property rights, contracts, disputes and liabilities.

The Institute for Public –Private Partnership-IP3 (2000) also adds that without professional legal framework and contracts, disputes are likely to occur. To cope with the various challenges and for reliability, partnership needs an implementation guideline to support the process. The implementation guideline will serve as a hand-on-manual outlining best practices for cooperation for all actors Ankoma, (2011).

2.3.2 Assessing a partnership

To gain understanding concerning the successes and failures created by partnership arrangement as well as its impacts, it is important to assess it. Different ways exist to look at partnerships and in this view two such frameworks are reviewed. Most of the literature focuses on the characteristics of the partners, why the partnership process and what makes it successful or unsuccessful is briefly looked at. Indeed, to use the words of Brinkerhoff (2002), "processes and institutional arrangements are not only difficult to measure, they are sometimes difficult to identify and articulate". The first framework is one proposed by Van Tulder (2007). The framework assumes that programs (here partnerships) are set up to address specific problems. To solve those problems, needs are identified and inputs and resources are mobilized to address them.

Figure 2.7 Partnership process



(*Source*: Simplified from Van Tulder, 2007)

The perspective forwarded by this framework, is that there is a set of goals and drivers of each partner that makes them enter in a process (the throughput). The results obtained in

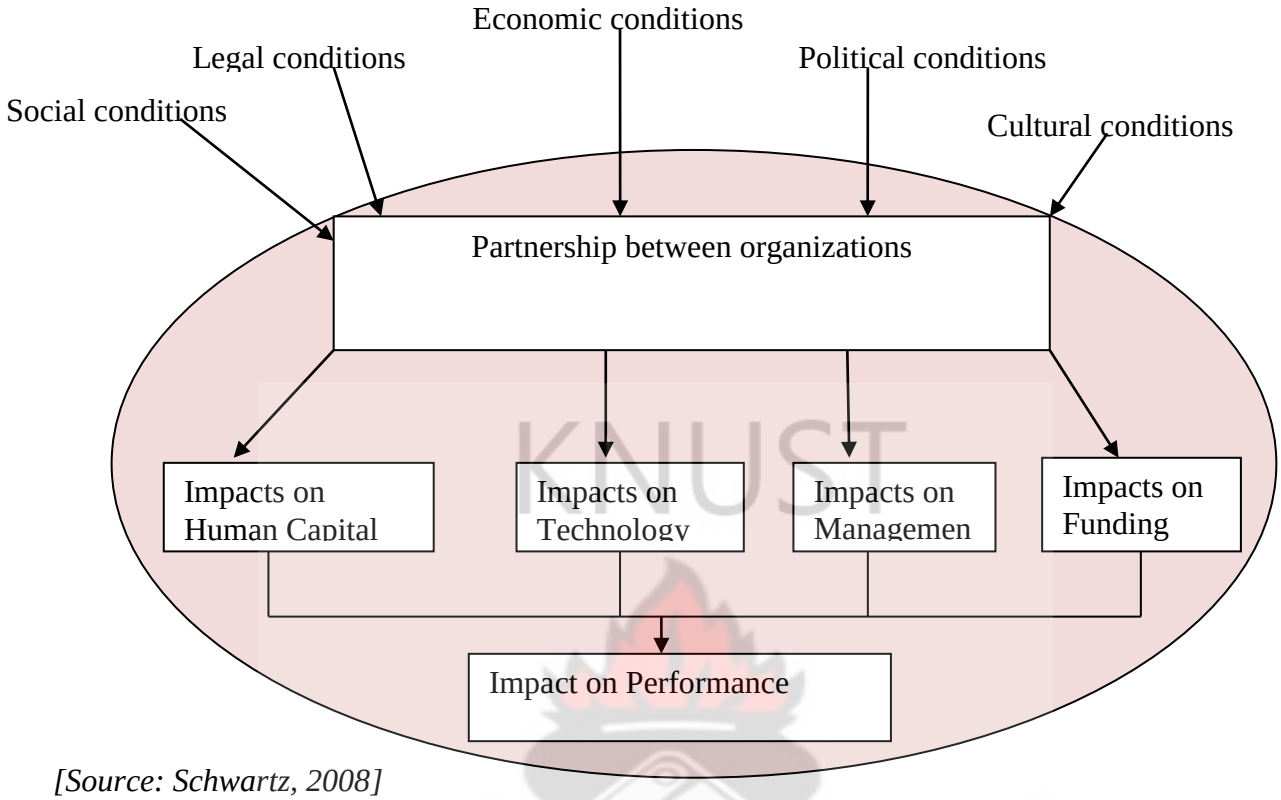
comparison with the original objectives form the outputs and finally Van Tulder looked at the outcomes of the partnership by looking at the direct and indirect contributions to the MDGs.

Bereziat (2009) suggests that, the degree of relationship is difficult to measure. She reports," it can be interpreted that the degree of confidence encompasses the trust between partners and the transparency while the degree of relationship encompasses the mechanism of accountability between partners and decision-making" (Béréziat, 2009).

To assess more specifically the partnership performance, a framework was reviewed which highlights the different ways a partnership can have impacts. The framework proposed by Schwartz (2008) did not look at the process or drivers taking place in the partnership, but provides a prominent place to the different impacts possible. Those impacts taken together are seen as the impact on the "performance" and on the service. It is the same idea developed by Van Tulder with "output" looking at the impacts on the partners, while the "outcome" would be more seen as the impacts on the performance (and in the society in general for Van Tulder's framework.)

Interestingly the feature of this framework proposes that the external context of the partnership is not only influencing the drivers but the partnership in its totality, as well as the different impacts.

Figure 2.8 Conceptual Framework for analyzing Partnerships and their Impact on service provision



[Source: Schwartz, 2008]

2.3.3 Partnership forms

There are many partnership forms on hand in the management of faecal sludge (collection and treatment of faecal sludge) in the sanitation sector that operate on different levels (international, national and local levels) with different partners (private sector and NGOs) Partnership which is usually formed Assemblies who are the local authorities as Waste Management Department and the private companies (private operators).

2.4 Public-private partnership (PPP)

The main purpose of this study is to evaluate the performance of public-private partnership in faecal sludge collection and treatment in Kumasi Metropolitan Area and Ashanti Akim North Municipal Area by the Assembly and the private companies in faecal sludge management in Ashanti Region of Ghana. As a result there is the need to elaborate on the public- private partnership existing between the actors involved.

2.4.1 PPPs definitions

PPP is an institutionalized form of cooperation of public and private actors, who on the basis of their own indigenous objectives, work together towards a joint target (Nijkamp *et al*. 2002). According to Hurst and Reeves (2004) PPP is an agreement between the public sector and a private sector company to provide an asset or public service, traditionally provided by the public sector, by the private sector or jointly as part of a PPP project. Moreover, PPP as far as this research is concerned will be defined as a contractual agreement between the public and the private sectors, whereby the private operator commits to provide public services that have traditionally been supplied by public institutions. For the collection and treatment of faecal sludge the public sector is represented by the local authorities; Metropolitan, Municipal and District that of the private sector by a private company (private operator)

2.4.2 The Need for PPP

In spite of all the economic burdens of most developing countries, they still have to grapple with challenges of faecal sludge management especially in the areas of collection and treatment such as indiscriminate dumping of faecal sludge into the environment including the water bodies, the use of untreated faecal sludge on farmlands etc which results in morbidity and mortality.

According to Antwi-Adjei, (2009), for faecal sludge management to be sustainable there should be a proper operation and maintenance which should involve integrating in its requirements a planning, design, implementation and management in which involvement of private agencies is essential. Some of the eroding service provision in most developing countries that calls for PPP are poor maintenance, lack of funds for operation and maintenance, inefficient emptying trucks, inefficient operations, , indiscriminate dumping of faecal sludge into the environment, low number and poor condition of treatment sites. One

option to cope with these challenges is partnership with the private sector (Strauss et al, 2004).

The PPP scheme is now seen as a popular organizational arrangement in developing countries to assist in effective operations of faecal sludge management due to its efficiency and usefulness (Kathy, 2005). According to Kathy (2005), PPPs application is appraised in several parts of Africa. In Dares Salaam, Durban, Maputo, Maseru and Nairobi, PPPs are practiced there with a well-planned and designed management contracts that are potentially improving performance of faecal sludge management for the benefit of the users of the services. Based on the information gathered from these authors, a well-planned and designed management contracts can potentially improve performance of faecal sludge collection and treatment.

2.4.3 Options of PPP

PPP embraces various types of contract arrangements with the private sector, diverging from short-term contracts, involving only a part of the service provided to longer-term contracts that apply to an entire service. In Ghana, the main PPP options available for consideration are: management contracts, build–operate–transfer (BOT), Joint ventures Concessions, franchise etc.

Table 2.2: Various Options for PPP in the Faecal Sludge Management

Option	Asset ownership	O&M	Cap. Inv.	Commercial. Risk	Scope of contract	Duration
Service contract	Public /private	Public / private	Public	Public	Cesspit emptying/faecal sludge treatment mgt	1–3
Management Contract	Public	Private	Public	Public	Full system	2-5
Lease	Public	Private	Public	Shared	Full system	10-15
BOT	Private	Private	Private	Private	Bulk supply	varies
Concession	Public/ private private	Private	Private	Private	Full system	25-30

Source (Saghir*et al*., 2000)

According to Sarpong Manu, (2001) the PPP options that have actually been under consideration and practiced in the history of Ghana's faecal sludge management are the concession, Franchise, Build–Own Operate (BOO), Build–Own–Operate–Transfer (BOOT) Management Contract.

2.4.3.1 Service Contract

Franceys *et al,* (2002), states that under a service contract, the Assembly hires a private company to carry out one or more specified tasks in the management of faecal sludge for a period. The Assembly remains the primary provider of the infrastructure service and contracts out only portions of its operation to the private partner such as management of faecal sludge treatment plant. The private partner must perform the service at the agreed cost and must typically meet performance standards set by the Assembly. Governments generally use competitive bidding procedures to award service contracts, which tend to work well given the limited period and narrowly defined nature of these contracts. Under a service contract,

Assembly is responsible for funding any capital investments required to expand or improve the system.

2.4.3.2 Build–Operate–Transfer (BOT)

BOT is a kind of specialized concession in the faecal sludge management in which a private Operator finances and develops a new infrastructure project or a major component such as treatment plant, public toilet etc according to performance standards set by the Assembly.

2.4.3.4 Lease Contracts

Under a lease contract, the private partner is responsible for the service in its entirety and undertakes obligations relating to quality and service standards. In faecal sludge management, the private operator provides the service at his expense and risk except for new and replacement investments, which remain the responsibility of the Assembly. Responsibility for service provision is transferred from the WMD to the private operator and the financial risk for operation and maintenance is borne entirely by the private sector operator. Under this arrangement, the initial establishment of the system is financed by the Assembly and contracted to a private company for operation and maintenance. Part of the tariff is transferred to the Assembly to service loans raised to finance extensions of the system.

2.4.3.5 Concessions

In faecal sludge management, the concessionaire is responsible for the full delivery of services in a specified area, operation, maintenance, management, and construction and rehabilitation of the management system. Under the concession, the operator is responsible for all capital investment. Whiles the Assembly is responsible for establishing performance standards and ensuring that the concessionaire meets them. In essence, the Assembly's role shifts from being the service provider to regulating the price and quality of service.

2.4.3.6 Joint Venture

Joint ventures are alternatives to full privatization in faecal sludge management in which the infrastructure is co-owned and operated by the public sector and private operators. Under a joint venture, the Assembly and the private partners assume joint ownership of existing facilities through a sale of shares to the private investor. From their position as shareholders, both have interest in the profitability and sustainability of the company and can work to smooth political hurdles.

2.4.3.7 Management Contracts

A management contract expands the services to be contracted out to include some or all of the management and operation of the public service. Although ultimate obligation for service provision remains in the public sector, daily management control and authority is assigned to the private operator. In most cases, the private operator provides working capital but no financing for investment. The private operator is paid a predetermined rate for labor and other anticipated operating costs (Franceys *et al,* 2002).

2.4.4 PPP Context in Faecal Sludge Management in Ghana

In Ghanaian perspective "Public" as a word is used to imply all government agencies. However, in this research it is specifically referring to the local authorities especially the Assemblies. The term "private" is used to describe the formal private sector ranging from multi-national companies through to small/medium sized private enterprises and informal service providers who basically operate with a profit motive. According to Thrift, (2007), until the year 1999, PPP was virtually unknown in faecal sludge management. He further states that some services previously managed by the WMD are now done by private contractors (e.g., sewage treatment and operation of many of the city's public toilets).

The introduction of private operators allows some continuity in a regularly changing political stage where local level institutions (like the sub-metropolitan assemblies, Town councils and Unit Committees) regularly change composition due to elections or power play. Before PPP can be feasible and adequately pro-poor, fine-tuning of institutional frameworks and substantial capacity building is required for most stakeholders. Finally regulation of faecal sludge management, in particular, needs clarity (Thrift, 2007).

2.4.5 Partnership Driver

According to Caplan et al, (2007) drivers are those "pushes and pulls" that determine or necessitate certain behavior or actions of partners. Drivers are constantly changing and they determine the scope and direction of partnerships and they should be the starting point of analysis. The drivers determine what drives partners to get involved in the partnership arrangement. The drivers are negotiated between the partners into desired targets reflected by proposed outputs, outcome and impacts. The negotiated targets are then reflected in resource commitments, made by each partner and contributions towards decision-marking (cited in Ankoma, 2011). In conclusion, if all partners are actively and effectively meeting their resource commitments and contributing to decision-making the partnership can thereby be deemed as effective as possible, i.e. if different partner drivers have been met, the partnership is successful, (Caplan *et al* , 2007).

2.4.6 Partnership Relationship

According to Brinkerhoff (2002), the purpose for assessing partnership relationship is to improve partnership practice in progress, refine and test hypotheses regarding partnership contribution to performance and outcome and also suggest lesson for future partnership work. She stressed on the fact that the outcome of any relationship between partners will affect the partnership success. Caplan (2001) argues that partnership should go deeper than mere contractual relationship between the different partners. The relationship between the various

partners can either end or progress the partnership formed. Partnership relationships are usually assessed using accountability and transparency.

An equitable partnership should be characterised by mutual accountability between partners, and there is the need to recognise that each party has different objectives and brings different capacity to the partnership. As suggested by Brinkerhoff"s (2002), there is the need for mutual accountability which includes regular reporting among partners, access to performance information, financial controls balanced with administrative imposition. This study will adapt her definition. Accountability manages the power relations between actors which affect each other directly or indirectly. It can be understood as "giving an account" to another party who has a stake in what has been done. It evokes a sense of taking responsibility, but it also holds the meaning of being held responsible by others – being "held to account" (Cornwall et al., 2000). Very good partnership is based on transparency between partners. Exchange of correct information is needed to achieve a transparent process.

Without such transparency trust between the partners will fail to develop. Clear rules are needed to define what should be included in information that is based on concise and complete data as reported by Graas *et al* (2007). Transparency according to Brinkerhoff (2002) is needed in formal information, exchange requirements and response to specific information requests, such as impromptu telephone calls, e-mails, and conversations, implying full participation of all member partners.

2.4.7 Partnership Performance

According to UNDP (2002), reviewing the performance of partnership involves the assessment of results (outputs), that is normally straight forward and an assessment of how the parties work together (relationship). Also for Gupta (2006), performance measurement can be defined as an approach to determine how effectively and efficiently the actors in

faecal sludge management deliver the required service. The writer stressed on that, performance of a system can be measured taking into account all the inputs used and outputs produced by the utilities. Improvements in sanitation have been shown consistently to result in better health, as measured by fewer diarrheas, reductions in parasitic infections, increased child growth, and lower morbidity and mortality. The expected reductions in mortality can be substantial, particularly in areas with low levels of education.

CHAPTER THREE

OVERVIEW OF STUDY AREA AND METHODOLOGY

This chapter describes the study area; its location, socio-cultural and economic profiles of the areas and provides an overview of the sanitation situation and goes on to describe the methodology adopted for the research. It further describes the method used for the study and provides a clear and complete description of the specific steps followed. The research methodology used various social research methods such as desk review and site visits.

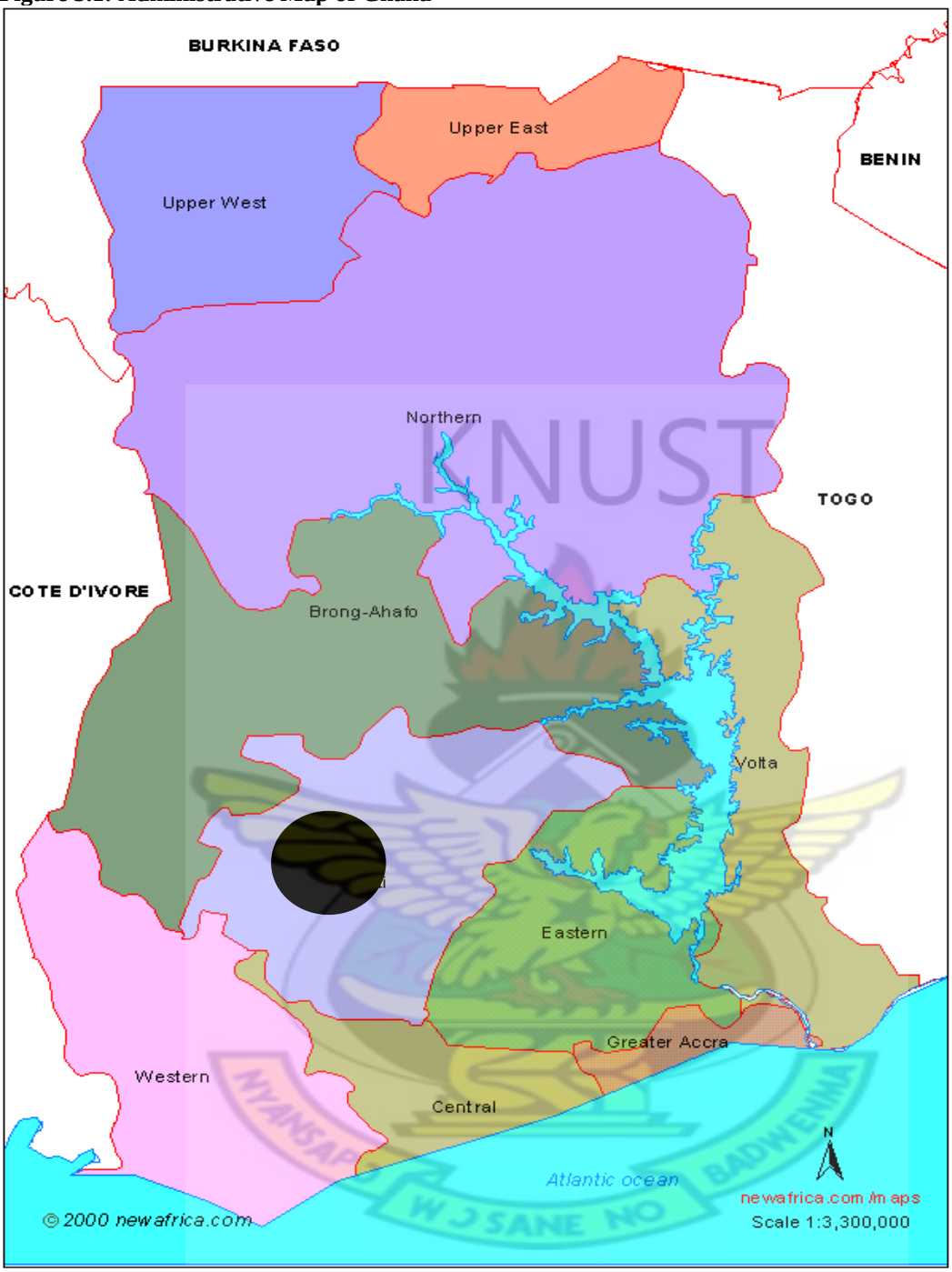
3.1 Description of the Study Area (KMA)

3.1.1 Location and size

Kumasi is located in the transitional forest zone, about 270km north of the national capital, Accra. It covers a total land area of 254 square kilometer, stretching between latitude 6.35^{o} – 6.40^{o} and longitude 1.30^{o} – 1.35^{o}, an elevation which ranges between 250 – 300 metres above sea level. Kumasi is bounded to the north by Afigya Kwabre District and Kwabre East District, to the east by Ejisu Juabeng District and Bosomtwe-Atwima Kwanwoma District, to the west by Atwima Nwabiagya District and to the south by Atwima Kwanwoma District.

The administrative map of Ghana and Kumasi Metropolitan Area in the regional and national context is presented in Figure 3.1, 3.2 and 3.3

Figure 3.1: Administrative Map of Ghana



(Source: Ghana Statistical Service)

Figure 3.2: Kumasi Metropolitan Area in Regional Context

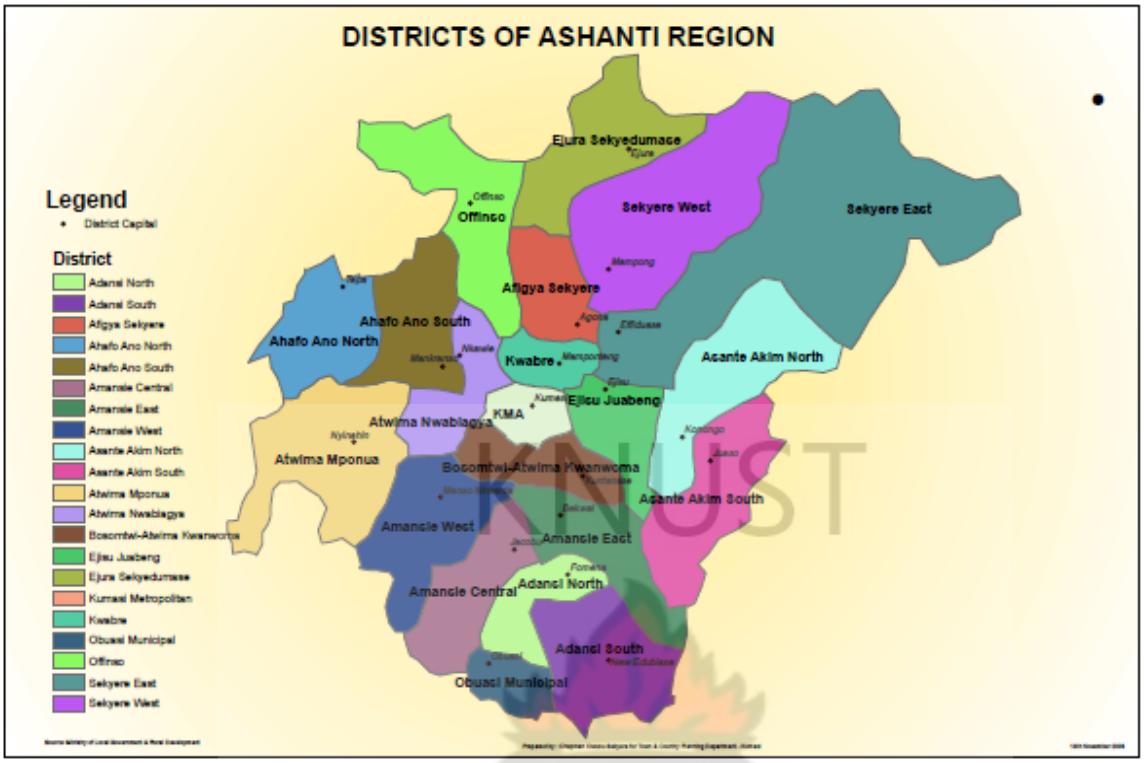
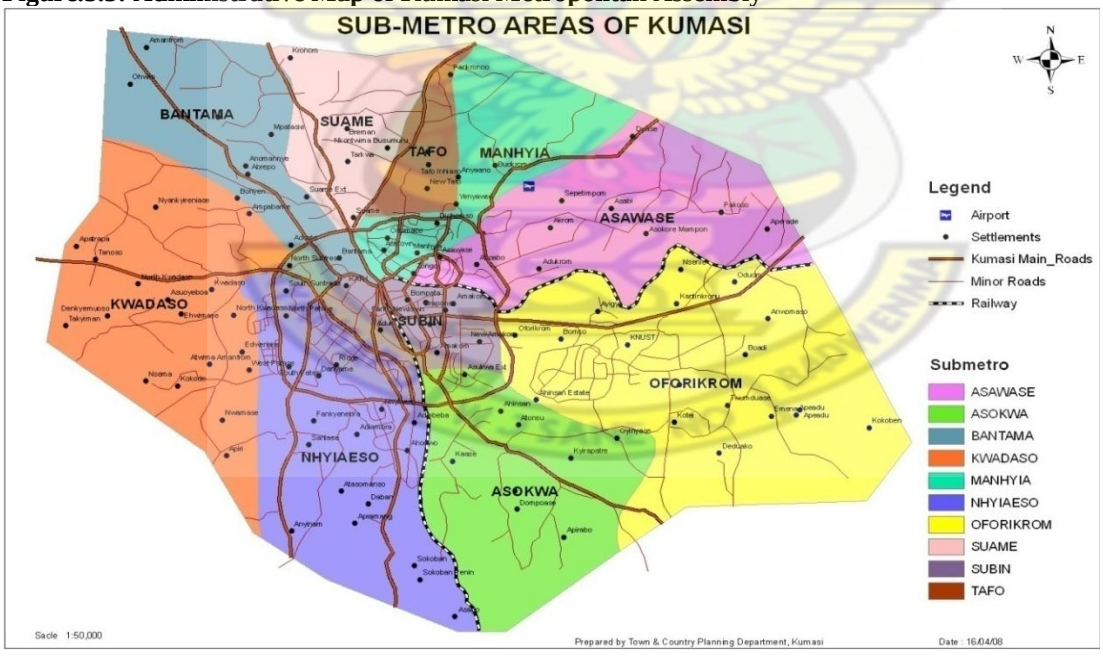


Figure.3.3: Administrative Map of Kumasi Metropolitan Assembly



(Source: Town and Country Planning Department)

Climate

The Metropolis falls within the wet sub-equatorial type. The average minimum temperature is about 21.5^{o}c and a maximum average temperature of 30.7^{0}c. The average humidity is about 84.16 per cent at 0900 GMT and 60 per cent at 1500 GMT. It has a double maxima rainfall regime ranging from 214.3mm in June and 165.2mm in September.

Population Size, Growth Rate and Density

According to the 2000 Population and Housing Census Report, Kumasi accommodated a total of 1,170,270 people as of 2000, reflecting an inter-censal growth of 5.4% between 1984 and 2000. It has been projected to a population of 1,915,179 in 2009 based on the inter-censal growth rate of 5.4%. This unprecedented growth of the population between 1984 and 2000 has made Kumasi the most populous district in the Ashanti Region in that it accounts for almost a third of the region's population. Compared to the national and regional growth rate of 3.4% and 2.7% respectively, the Metropolis is growing at a faster rate indicating the attractiveness of Kumasi in the region.

Culture

The Kumasi Metropolitan Area is seen as multi-ethnic area. Almost all the ethnic groups in Ghana exist in this area. The hospitable nature of the Asante's is reflected in the exceptional reception extended to strangers, which is embedded in the Akan word 'Akwaaba', which means welcome. Though the Metropolis has a strong Islamic presence especially in and around Asawase, Christianity remains the most dominant form of religion for the people in the metropolis. Number of people however; maintain they are traditionalists and the rest, oters also profess no religion at all.

Health

There are 189 health facilities in the Kumasi metropolitan area of which the private sector operates a significant number. Most of the cases reported by patients at the health facilities are malaria related sickness. This could be traced to the poor environmental sanitation bedeviling the Metropolis, which often serves as breeding grounds for mosquitoes. Doctor to population ratio of is 1:41,606 and 1:7,866. In general the health sector in the district is plagued with inadequate health facilities, personnel and inadequate office space for the Health Management Team.

Poverty

The incidence of poverty in the Metropolis is more pronounced in the peri-urban and slum communities. This is because these areas are often characterized with either inadequate or non-existent of facilities/opportunities, poor housing, road network and educational facilities. Also, inadequate access to quality health care, poor environmental sanitation, high illiteracy rates, relatively low incomes and high unemployment levels among others.

Settlements in the Metropolis that are plagued with this incidence are Apatrapa, Dompoase, Ayeduase, Nyankyerenease, Kokoben, Asawase, Aboabo No 1 & 2, Moshie Zongo, Dichemso Old Town, Ayigya Zongo, Dakwadwom, Sawaba, Yalwa near Asem, Daban, Kaase, Sokoban, Nsenie, Anwomaso etc.

Water Situation

With regard to water, the households have access to various kinds of water facilities. These facilities include Pipe – Borne, Tanker Supply, Well, Borehole, Spring/Rain Water, Rivers/Stream and Dugout (Figure 5, Appendix 3). 97% of the households have access to potable water for drinking and carrying out other household chores. Pipe-borne water facility

supply water to over 80 percent of the households in the Metropolis. The supply of potable water by pipe-borne facilities is plagued with irregularity resulting in acute water shortage in the Metropolis. This has contributed to the increase in the number of households using water from well.

Sanitation Situation

Liquid Waste

There are ten (10) Sub Metropolitan District Councils within the Metropolis. These are Asawase, Asokwa, Bantama, Kwadaso, Manhyia, Nhyiaeso, Oforikrom, Suame, Subin and Tafo. Toilet technologies at the household level in the Metropolis included Ventilated Improved Pit latrines (VIPs), Kumasi Ventilated Improved Pit latrines (KVIPs)Water Closets (WCs) bucket latrine and the free range practice among few people.

Wastewater

The principal generators of waste water in the Metropolis are the industrial facilities. Industries known for discharging large volumes of effluent in Kumasi are Guinness Ghana Brewery limited, Coca Cola Bottling Company and Kumasi Abattoir. However, Guinness Ghana Brewery limited and Coca Cola Bottling Company have install treatment plants on the site with Environmental Health Officers who ensures that the effluent discharge into the water bodies in the Metropolis are free from contamination. The abattoir, however, is not endowed with this facility hence has been discharging their untreated effluents into the water bodies.

3.2 Description of Asante Akim North Municipal Area

The Asante Akim North Municipal Assembly is one of the 27 Districts in the Ashanti Region. It was carved out of the erstwhile Asante Akim District Council in 1988 as part of the Ghana's Decentralization Process. It has Konongo-Odumasi as its twin Capital Town.

3.2.1 Location and Size

The Municipality is located in the eastern part of Ashanti Region and lies between latitude 6^0 30' North and 7^0 30' North and longitude 0^0 15' West and 1^0 20' West. It covers a land area of 1,160 sq. km with an estimated population of 169,976 in 2010 (projection from 2000 Population Census). The Municipality shares boundaries with Sekyere East at the north, Kwahu South at the east, Asante Akim South at the south and Ejisu-Juaben at the west.

Figure 3.4 Map of Ashanti Region, showing konongo

Source: Rodgers Bosompem Manu, 2012

Climate

The Municipality lies within the semi-equatorial belt characterised by double rainfall maxima occurring in July and November; the first rainy season from May to July and the second from September to November. The dry harmattan season occurs between December and April and is associated with drought conditions. Streams dry up during this period. Temperature is found to be uniformly high all year round with a mean annual temperature of 26^oC.

Population Size, Growth Rate and Density

The population of the Municipality for the censual periods of 1970, 1984 and 2000 were 53,776, 79,260 and 126,477 respectively. Between 1970 and 1984 the annual growth rate was 2.8%. However, the annual growth rate rose to 3.0% between 1984 and 2000.

Culture

The vast majority of the population in the Municipality is Akan constituting 77.4%. Mole Dagbanis and Ewes respectively account for 8.5% and 4.6% of the population. Ethnic groups that individually account for less than 3% of the Municipality's population are Grusis (2.4), Mande-Busangas (2.2), Guans (1.6), Ga-Dangbes (1.5) and the Grumas (1.2). All other ethnic groups constitute 0.7% of the population. 79.9% of the population is Christian, with 8.8% Muslim, 1.3% Traditionalist, 0.5% other religion, and a further 9.4% claiming no religion.

Health

The municipality has 12 operational health facilities serving 170,883 people. 7 of these health facilities are public while 6 are private. Most prevalent diseases in the municipality (e.g. malaria, diarrhoea, buruli ulcer, and typhoid) tend to be linked to environmental conditions (sanitary related) in the municipality. Buruli ulcer is a major problem particularly in the Afram Plains area, while severe malaria cases have been reported in Odumasi.

Water Supply

The major sources of water in the municipality include pipe borne, borehole, stream, well and others. However, the most common source of potable water in the Municipality is boreholes which serve about 45 communities in the Municipality. The 'Quality of Pipe borne' water is not good in the Municipality. The pipes are very old and this creates room for contamination through leakages in pipe lines. Hence the water ready at source for consumer consumption is not good for health reasons. This has led to high incidence of typhoid disease and other water

borne-related diseases in the municipality. The major sources of water in the municipality are shown in (Table 1, appendix2)

Sanitation

Environmental Health and Sanitation issues continue to be one of the major problems facing the Municipality. This include inadequate public/household latrines thus exacerbating pressure on the few public toilets; indiscriminate defecating and dumping of refuse and excreta in drains and bush; choked gutters; piles of accumulated refuse/garbage at dump sites in some parts of localities and littering of public places.

3.2.3: Methodology

This section explains the approach used for the study and provides a clear and complete description of the specific steps followed. The study used diverse social research methods such as desk study and field works based on interview.

3.3.1 Desk review

The desk review involved a broad literature review of existing policy document on sanitation of the Assemblies as well as Environmental Sanitation Policy of Ghana. There was a review of various documents as well as other relevant information on the internet. Important documents that were reviewed from the two Assemblies included; profile on faecal sludge collection rate and how the treatment plant works, responsibilities of the actors in faecal sludge collection and treatment, contract arrangement for collection and treatment of faecal sludge. Monitoring information and documentation, technical and financial information from PO/MMDAs were as well reviewed

3.3.2 Field Work

The field works involved consultation with members of the Assembly and the POs in charge of collection and treatment of faecal sludge. Data were collected from relevant stakeholders through interviews which included key informant interviews.

Ten (10) POs in Kumasi metropolis were randomly selected to interview. In Asante Akyem North, POs in faecal sludge collection and treatment were not interviewed since the Assembly does not engage private companies in such activities. The questions were in an open ended form and were based on issues of accountability, cost recovery, technicalities of operation, etc. Five staff members each from the Assemblies were interviewed. The questions asked were based on issues of contract arrangement, roles and responsibilities, and also performance of the management scheme, financial, technical, management support, reporting issues etc.

Key informant interviews

There were special interviews that were conducted to the major stakeholders which included representatives of the POs and the As in each of the two study areas for collection and treatment of faecal sludge. Some of the issues that were discussed included performance of the, contract arrangement, roles and responsibilities, state of faecal sludge collection and treatment in the area, etc.

Analytical Framework for Data Analysis

Qualitative date from the small groups and interactive discussions were recorded and documented for further analysis. Questions for the interviews were open-ended to allow active participation and also afford respondents to express their views and perceptions freely unlike in structured questionnaires. Microsoft Excel, 2007 software were used to analyze

results from interviews and discussions. The different analytical tools and methods used for the research objectives and the variables measured have been presented as the objective and methodology matrix table in Table 3.1

Table 3.1Project Objectives and Methodology Matrix

Specific Objectives	**Variables Measured**	**Data Collection Methods for specific objectives**
-To assess types of technologies used in faecal sludge collection and treatment in each area.	-List of all existing technologies used for faecal sludge collection and treatment options available.	-Interviews with MMA and Private operators -Visual inspection and observations of collection trucks and sanitation facilities - Qualitative analysis and interpretation of findings.
-To examine quantity of faecal sludge collected in each study area.	-List of householders and public toilet managers applying for desludging services. -List of trips made by each company per year.	-Interviews with MMA and Private operators -Qualitative and Quantitative analysis and interpretation of findings.
-To determine the role of public and private sector partnership in faecal sludge collection and treatment.	-List of all stakeholders involved in faecal sludge management -Roles and responsibilities of each of the stakeholders -Management arrangements for collection and treatment of faecal sludge -Problems faced by stakeholders in managing faecal sludge. -Policy framework for faecal sludge management	-Interviews with MMA and private companies -Through MMA's reports and other documentations -Qualitative analysis and interpretation of findings
-To examine factors that affect PPPs in faecal sludge collection and treatment in the study areas	-List of factors affecting ppp in faecal sludge collection and treatment	-Interviews with MMA and private companies - Qualitative analysis and interpretation of findings

CHAPTER FOUR

ANALYSES OF DATA (RESULTS AND DISCUSSIONS)

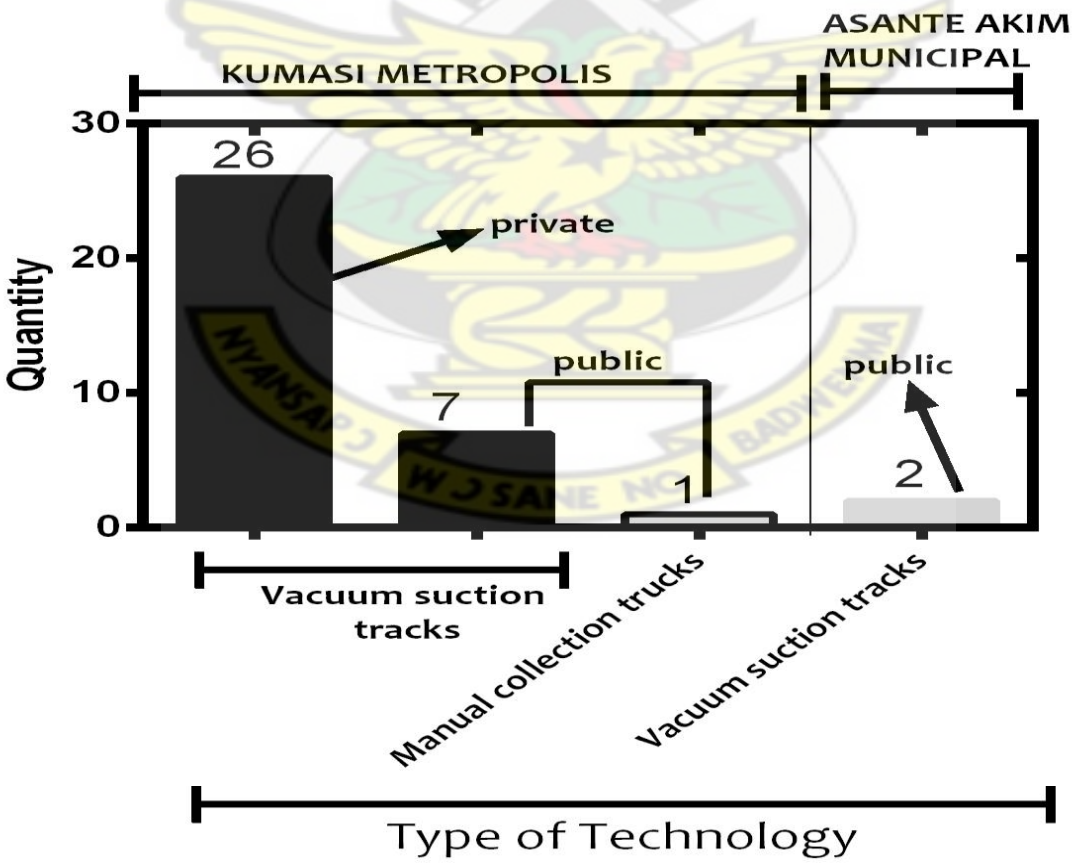
4.0 Introduction

The findings for the study are presented in this chapter. It is organized by methods used in faecal sludge collection, faecal sludge storage facilities used in Kumasi and Ashanti Akim North, quantity of Faecal sludge generated and collection rate, Role of both public and private partners in faecal sludge collection and treatment and factors affecting the existing public-private partnership in faecal sludge collection and treatment.

4.1 Faecal sludge collection technologies.

4.1.1 Methods Used in Faecal Sludge Collection

The methods used in Faecal Sludge Collection in the two Assemblies are shown below:



There are various methods used in collecting faecal sludge from households and public toilet but those that are used by the Kumasi Metropolitan Assembly include vacuum suction trucks and manual collection truck whereas for Asante Akim North Municipal Area, vacuum suction trucks was the only method used in faecal sludge collection (Table 4.1). The number of trucks ofa capacity of 5 to 8m^3 available at KMA for collecting faecal sludge from household and public toilet were 34 (33 being vacuum suction trucks and 1 being a manual truck). Eight (8) of these trucks are owned by the public institutions including KMA, and 26 are owned by the private companies. However, in the Asante Akim North Municipal Area, only two (2) trucks were used, owned by the Municipal Assembly (private operators are not contracted for faecal sludge collection and treatment).

4.1.2 Mechanical de-sludging of faecal sludge in the Study Areas

In both assemblies, only faecal sludge from KVIPs, and WCs with septic tanks were emptied mechanically using cesspit emptier or suction trucks unlike those from pan/bucket latrines, pit latrines, aqua privies, Enviro-loo and VIPs which are manually emptied by the Assemblies own manual collection truck. The interviews with private operator revealed that desludging of septic tanks was comparatively easier than that of the KVIP because the waste was in its liquid form. Since users at times dumped in all sorts of solid materials into the KVIPs which could block the hose of the cesspit emptier, it however posed problem when desludging faecal sludge from KVIPs. It also increases the time of de-sludging KVIP since the faecal sludge is first mixed with water and all solid materials removed before final desludging is done.

The rate at which the toilets were de-sludged depended on the number of people patronizing it, the number of seats and size of the facility being used. For a 34-seater WC, with an average of 300 - 400 visits / day, de-sludging is done almost every two weeks. The operators

disclosed that charges for de-sludging depends on the capacity of the cesspit emptier used and the number of trips made. One officer reported:

"Fees for desludging are charged per the capacity of cesspit emptier. For instance, with 5mc3 capacity truck, GHC 100 - GHC120 is charged per trip".

Charges are same for both private and public, also depended on proximity and how accessible the facility is with reference to the truck. If the hose needs to be connected to increase its length before reaching the septic tank, extra charge is added to pay for the lengthening of the hose. Again if the facility is relatively far from the final disposal site, the charge is relatively higher.

4.1.3 Manual De-sludging of Faecal Sludge

Some sanitation technologies can only be emptied using buckets and shovels, because the material is solid and cannot be removed with a vacuum or a pump. Faecal sludge from facilities like, pit latrines, enviro-loo and VIPs were emptied manually. Kumasi Metropolitan Area together with Ashanti Akim North Municipal Area experience situations where workers usually unprotected, dig or bucket out the tank or pit contents into tanker that takes the *sludge* away for disposal though same fees are paid as in the use of the vacuum suction.

Plate 4.1An unprotected worker manually de-sludging excreta from pit latrine at Konogo Odumase

Source: field survey, 2011.

A toilet emptier passes the bucket full of sludge to his assistant. The study disclosed that, most people undertaking manual empting for the assembly work in both KMA and AANMA do it without any protective clothes like gloves, boots, mask etc. They ignore their use because they think they are expensive but the health risk in this is extremely high. However, in Ghana, Environmental Sanitation Policy makes great emphasis on the need to use these protective clothes at work as it is in the critical requirements for efficient operation of environmental sanitation services such as faecal sludge collection and treatment services.

4.2.1 Collection companies involved in faecal sludge collection

Private operators currently involved in faecal sludge collection in KMA are 23 and they have 26 suction trucks as stated earlier as against 8 trucks owned by KMA and the seven public institutions (Prison Service, Vodafone Company, UEW-K, Ghana Armed Forces, Police Service, and KNUST). There is a competitive market for private operators who collect faecal sludge (that transport faecal sludge from septic tanks and KVIPs to the city's treatment site), and are licensed by KMA. Private Operators apply to the office of Waste management Department at KMA for a license. Private Operators (POs) are expected to have proper

functioning trucks and be people of good behavior before they given the licenses. However, licenses of POs can be revoked when regulations are not adhered to. A KMA officer indicated that there are still people who empty bucket latrines, although contracts and licenses are no more awarded. Though, he indicated that these services are gradually being phased out.

4.3 Faecal sludge treatment technologies

4.3.1 Faecal Sludge Treatment Plant Available at KMA (Dompoase Treatment Site)

Faecal sludge treatment plant with a design capacity of 300m^3/ day and 300m^3/ day of leachate in use in Kumasi metropolitan area is located at Dompoase land fill site. It became operational in March 2004. The facility consists of anaerobic ponds, facultative ponds and maturation ponds to treat faecal sludge and landfill leachate. Sludge collected from households and public toilet in Kumasi metropolitan area is discharged into anaerobic ponds and then flows into the facultative pond which is quite shallow in nature and very large to allow enough sun energy needed for breakdown of pollutants in the sludge after which it moves into the maturation pond. From the maturation pond, the sludge discharges into stilling basin where dilution takes place before discharging into the Oda river without further treatment as shown in Plate 4.2. With increase in population based on an inter-censal growth rate of 5.4% from 2000 population and housing census (GSS, 2000), the design capacity of 300m^3/ day and 300m^3/ day of leachate of the plant from the inception of the system is not able to meet the current demand of services being provided. However, workers at the site are given safety clothing (protective uniforms, hand gloves, nose masks and wellington boots) and materials to help them work under safe and hygienic conditions (KMA, 2011).

Plate 4.2 Dompoase faecal sludge treatment plant

Source: field survey, 2011.

4.3.2 Final Disposal Site at Asante Akim North Municipality

Faecal sludge collection from the households and the public toilet are disposed of at a final disposal site nearby. Since the assembly has no faecal sludge treatment plant at the Municipality, the assembly has dug a big pit into which the collected sludge is dumped. Treatment of the faecal sludge in the pit is done by the sunlight as shown in Plate 4.3. The pit is covered when full and a new one dug after. However, it was observed that it poses a threat to the surrounding environment since the pit is not engineered and leachates can easily get to underground water and surface water during flooding.

Plate 4.3 Final faecal sludge disposal site at Asante Akim North Municipal Area

Source: Field survey, 2011.

4.3.3 Indiscriminate Dumping of Faecal Sludge

Responses gathered from the representatives of both KMA and Asante Akim North Municipal Area in this study reveals that there has not been unlawful dumping of faecal sludge in the two assemblies. One officer from KMA reported:

"Both private and public operators have been complying with directives and do not dump faecal sludge indiscriminately".

This was consistent with report by (Vodounhessi, 2006), which also indicated that there has not been any illegal dumping in the Metropolis (KMA).This is as a result of the competitive market between private operators, the KMA's ability to withdraw the licenses of operators that dump illegally, and also community participation in denouncing those who dump illegally though there are few cases of indiscriminate dumping of faecal sludge (Thrift, 2007).With regards to Asante Akim North Municipal Area, faecal sludge collection services are done basically by the Assembly itself therefore; there is noindiscriminate dumping of faecal sludge by sludge emptiers.

4.3.4 Situation of FS management in KMA & AANMA

According to the Environmental Sanitation Policy of Ghana (2010), essential equipment and supplies identified as critical requirements for the efficient operation of environmental sanitation services and programmes which are the key outputs of a sustainable environmental sanitation development of any Ghanaian town should include vacuum tankers, treatments plants, vehicles for general use, Masks, gloves, boots, overalls, etc (Government of Ghana, 2007).With regards to these key outputs of the Environmental Sanitation Policy, KMA meets the requirements because it has the hands of the private operators coming in with relatively higher number of trucks for faecal sludge collection with their workers being well armed with protective clothing.

The collaboration between KMA and the private companies has led to some amount of improvement in terms of wide area coverage in faecal sludge collection and treatment with drastic reduction in illegal dumping of faecal sludge into unauthorized environment even though some work needs to be done. This is as a result of KMA's ability to revoke the licenses of defaulting private operators.

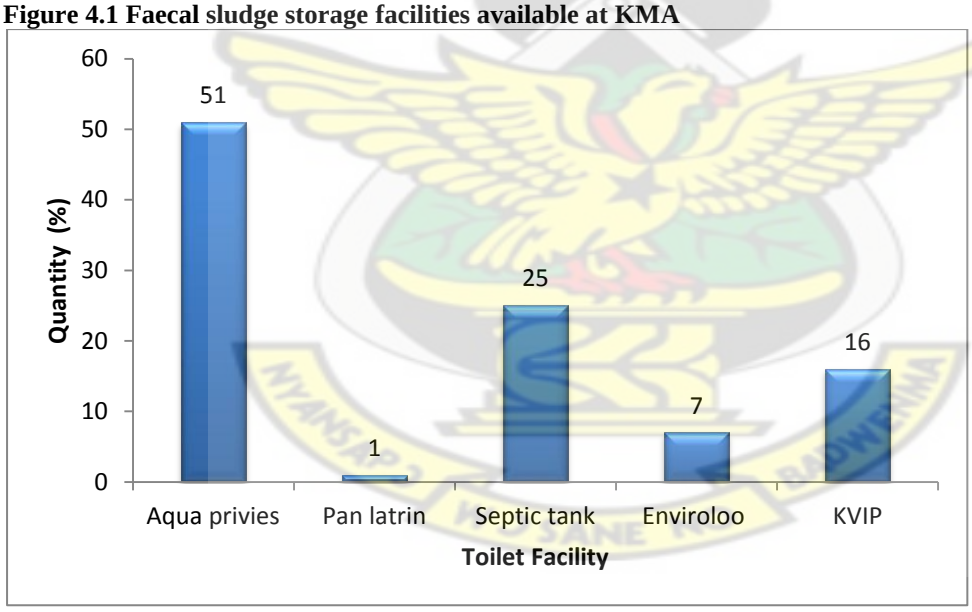
On the contrary, Asante Akim North Municipal Assembly meets the target that affirms the use of Protective Clothing such as masks, gloves, boots, overalls etc and struggling with enough vacuum suction tracks to collect faecal sludge of which the Environmental Sanitation Policy mandates the Assembly to procure (Environmental Policy of Ghana, 2007). However, the assembly falls on private operators from other district to desludge when their two trucks are not in good condition or busy, though there is no formal contract between them.

4.4 Faecal sludge storage facilities at Kumasi Metropolitan Area (Household & Public facilities)

4.4.1 Available toilet Facilities at KMA

A variety of sanitation technologies are used in both household and in public in Kumasi Metropolis. Figure 4.3 shows the available toilet facilities used at KMA from which FS is collected and treated. Fifty-one percent (51%) of the toilet facility available were aqua privies, which appears to be used more frequently. Twenty-five (25%) were septic tanks, 16% of the facilities were KVIP, 7% were Enviro-loo and 1% represented pan latrine (bucket latrine). It can therefore be inferred from the results that majority of the toilet facilities used in Kumasi was Aqua privies followed by septic tanks and KVIP. Enviro-loo and pan latrine were the least used toilet facilities in the Kumasi Metropolis.

Figure 4.1 Faecal sludge storage facilities available at KMA



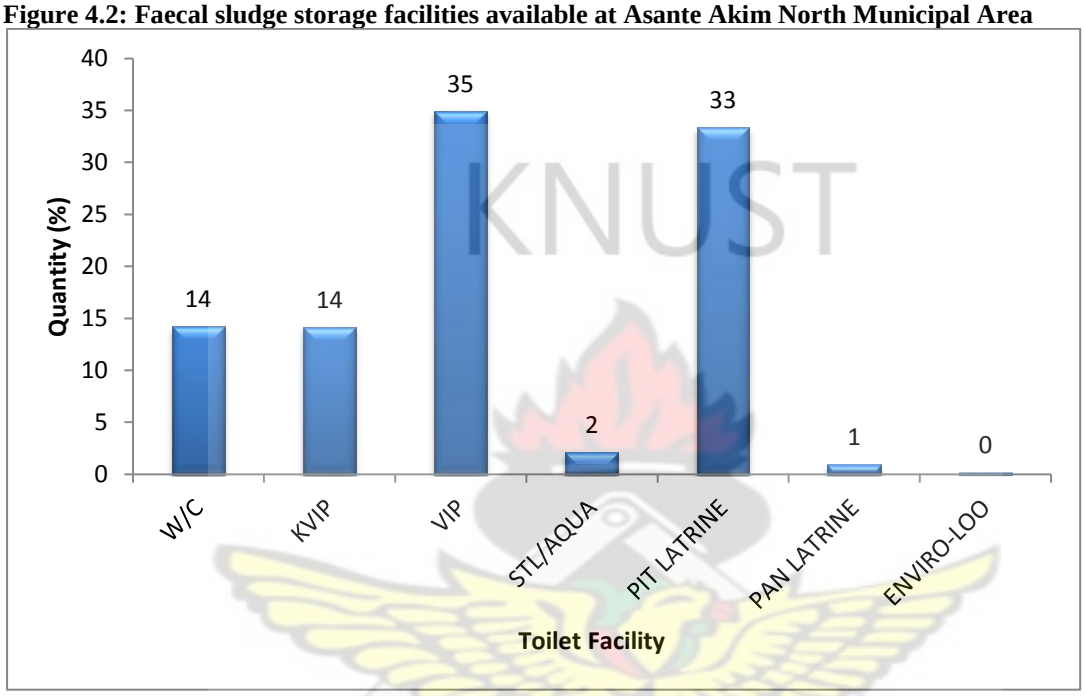
Source: (Waste Management Department, KMA, 2011)

4.4.2 Faecal sludge storage facilities Available at Asante Akim North Municipal Area

Figure 4.2 shows the excreta disposal facilities available at Asante Akim North Municipal Area. From the study, 35% of the toilet facility available in the Asante Akim North Municipal Area were VIP, 33% were pit latrine, 14% of the facility were water closet (W/C)

and KVIP respective. Two percent (2%) of the facilities were Aqua privies while pan latrine constituted 1%. However, there was no Enviro-loo recorded. It can be inferred that the most common toilet facility used in the Municipality is the VIP followed by pit latrine, water closet and KVIP. Aqua privies and pan latrines were used by a small proportion of the inhabitants.

Figure 4.2: Faecal sludge storage facilities available at Asante Akim North Municipal Area



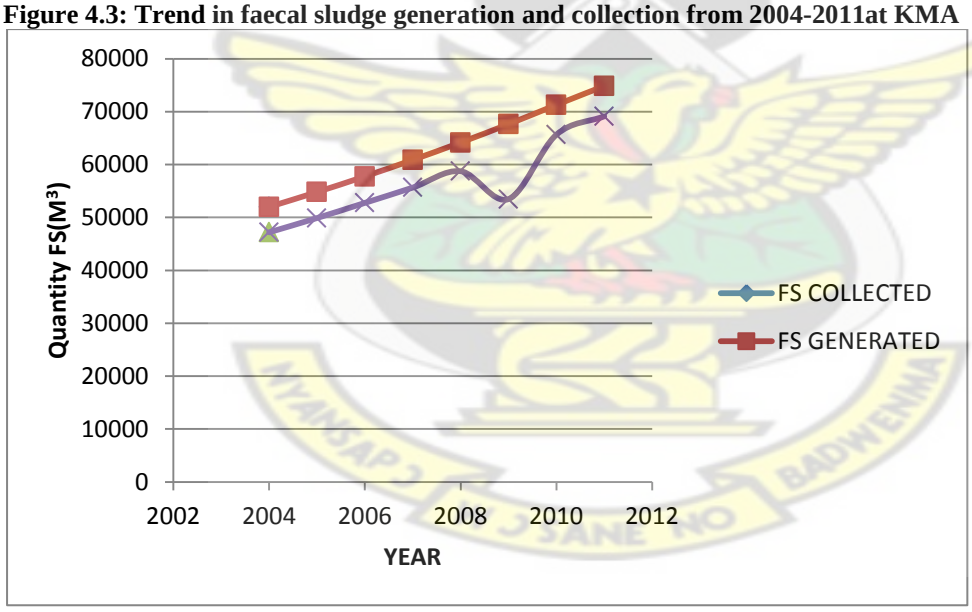
Source: (Waste Management Department, AANMA, 2011)

4.4.3 Trend in quantity of faecal sludge collected at KMA

Based on the specific FS production of 1.0 L/cap/day for septic tanks sludge and 0.2L/cap/day sludge production from toilets without water use (WMD, KMA), in 2011 for instance the total FS production of Kumasi was estimated to be 74848.651m^3 in. Of this amount, 6750.833$m^3$is estimated to come from toilet pits or tanks that can be emptied. The remainder ends up in the sewage system and the bush. This was estimated using the specific FS production of 1.0 L/cap/day for septic tanks sludge and 0.2L/cap/day sludge production from toilets without water use (WMD, KMA) in years (m^3) by the estimated population in 2011.

Figure 4.3 shows the trend in faecal sludge generated from 2000-2011 at KMA. There was a gradual increase in faecal sludge generation as population growth increases. Increases in the population affect the amount of faecal sludge generation but there was a gradual increase from 2004 to 2008 then a fall from 2008 to 2010 then a rise in 2011 in amount collected. The fall between 2008 and 2010 can be attributed to poor record keeping and changes in the administrative heads. This is because new administrators tend to review existing contracts and policies made in the past with the view of improving or terminating poorly managed ones. Then again, the trend in the amount of faecal sludge not being collected rose up between 2008 and 2010, indicating huge quantities of FS generated being disposed of unrecorded and secretly within the urban settlement area, though there has not been any reported case.

Figure 4.3: Trend in faecal sludge generation and collection from 2004-2011at KMA

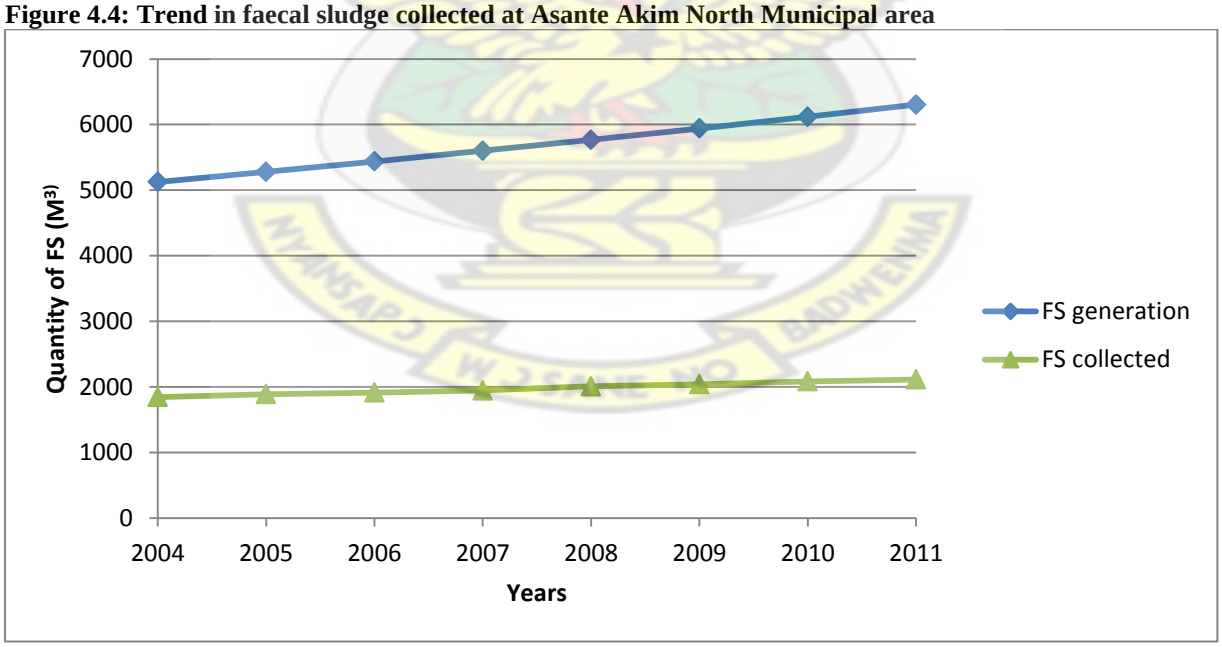


Source: field survey, 2011

4.4.4 Trend in faecal sludge collected from 2004-2011 at Asante Akim North Municipal area

Figure 4.4 shows the trend in faecal sludge (FS) generated from 2004-2011 at Asante Akim North Municipal area. There was an increase in faecal sludge generation as population growth increases. However, a linear trend was observed in the amount of faecal sludge collected. Increases in the population affect the amount of faecal sludge generation and the sludge which is not collected in the Municipality. A total of 6302.655m^3 of faecal sludge was generated in 2011, out of which 2,115m^3 was collected with the remaining 4187.655m^3being left secretly in the environment. Considering the estimated population for the year 2011, the estimated amount of faecal sludge generation for that same year far exceeds the amount of FS collected to the final disposal site. Based on this report, it can be inferred that huge quantity of FS is left uncollected. This can be attributed to less number of trucks own by the Assembly and non-involvement of POs in the collection activity in the municipality.

Figure 4.4: Trend in faecal sludge collected at Asante Akim North Municipal area



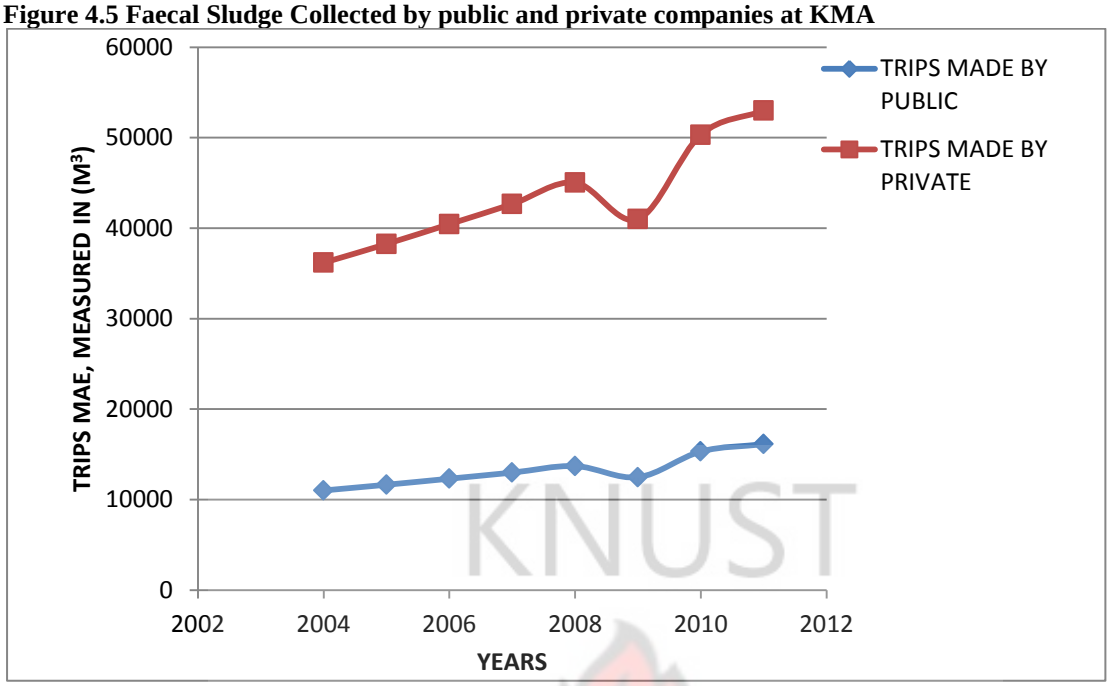
Source: field survey, 2011

4.4.5 Quantity of faecal sludge collection at KMA by public and private companies

Figure 4.5 below shows the rate in faecal sludge collection by the various companies involved in faecal sludge collection at KMA to Dompoase treatment site. There was an increased in the quantity of FS collected from 2004 to 2008, until the trend change and fall between 2008 to 2010 was observed for quantity of sludge collected by both private and public which may be due to poor records and change in administrative heads resulting in revision of existing contracts and policies made in the past with the view of improving or terminating poorly managed ones.7236 number of trips and 10597 numbers of trips were made by the private companies in 2004 and 2011 respectively, corresponding to 36181.86m^3 and 52987.13m^3 quantities of FS collected the respective years. The public institutions including KMA also made 2202 number of trips in 2004 and 3225 number of trips in 2011 and also collecting11011.87m^3 and 16126.52m^3 in 2004 and 2011 respectively.

The increase in trips made and huge quantity of FS collected by the private companies is as a result of the use of new technologies and expertise and gaining access to increased capital and greater economic efficiency to improve operations and generate revenue. Almost 77% of total FS collected to dompoase treatment site were collected by the private companies indicating how efficient private sector is, in terms of available resources to enhance performance.

Figure 4.5 Faecal Sludge Collected by public and private companies at KMA



Source: Field survey, 2011.

Provision of final disposal and treatment site

Kumasi Metropolitan Assembly has provided faecal sludge treatment plant with a design capacity of 300m^3/ day and 300m^3/ day of leachate in use in Kumasi metropolitan which is located at Dompoase land fill site. It became operational in March 2004. In Asante Akim Municipality, the assembly has dug a big pit into which the collected sludge is dumped.

4.5.2 Provision of Funds and Cost Recovery

KMA mobilizes revenue to finance feacal sludge collection and treatment services. Development Fund from District Assemblies' Common Fund is used to cover investments in feacal sludge collection and treatment management. Feacal sludge management projects from KMA are submitted for Central Government grants. KMA also rely on some of the fines from environmental sanitation offices, EPA's Environment Fund, taxes on pollution and polluters to finance feacal sludge management activities.

4.5.3 Monitoring of Operation of Collection Companies and the Operation and Maintenance of Treatment Plant

The Assemblies take charge of the activities of the collection companies in the discharge of their duties. They have the ability to withdraw the licenses of operators that dump illegally and misconduct themselves. The WMD of KMA has representatives at the treatment site to take record of all the faecal sludge sent to the site for treatment and to regulate the private company on his operation and maintenance activities of the whole treatment system.

4.5.4 Subsidizing Taxes for the Importation of Truck's Spare Parts.

The policy continuous to state that, there will be availability of spare parts at least partly assured through the standard specifications issued by Ministry of Local Government and Rural Development (MLGRD). The Ministry, along with the District Assemblies and private sector service providers, should maintain a continuous dialogue with the spare parts suppliers to ensure constant availability. Yet, information gathered from the private collection companies indicates how difficult it is for private companies to come by their trucks' spare parts. The study outcome showed that some of the parts are not even available and those that are available are too expensive to afford.

4.6 Role of private sector partnership in faecal sludge collection and treatment

4.6.1 Collection of Faecal Sludge in the Municipality

The study results revealed that desludging services in the Metropolis is carried out by WMDs of the Assemblies and a number of private service providers. In order to achieve the missions of Environmental Sanitation policy of Ghana, most of the Assemblies have engaged private companies in the collection of faecal sludge from both the household and the public toilet to be dumped strictly at legal dumping site such as Dompoase treatment site in the case of KMA.

4.6.2 Collection of Revenue for Emptying of Faecal Sludge

The collection companies are involved with collection of revenue from households for emptying of feacal sludge. According to the Waste management officers, collection companies charge between GH¢10.00 and GH¢120.00 per trip to empty faecal sludge from households and public toilets depending on the proximity of the truck to the septic tank being emptied at the vicinity. They however indicated that this partnership has been very helpful in taking care of faecal sludge in the Metropolis.

4.6.3 Payment of Tipping Fees to the Assembly at the Treatment Site

On the other hand, the private companies pay a fee to the assembly for tipping of feacal sludge at the Assembly's Feacal Sludge Treatment Facility. This attracts a tipping fee as specified in Assembly's Fee Fixing Resolution Service providers who render services for collection of faecal sludge pay an amount of GH¢4.00 per trip to the office of KMA at the treatment site to empty the faecal sludge for onward treatment.

4.6.4 Operation and Maintenance of the Treatment Plant at Dompoase

The private companies also support the management and maintenance of the treatment plants. The study found that, management and maintenance of the Dompoase treatment plant is done by a private firm (J. Stanley Owusu Company). They are regulated and supervised by facility treatment supervisor from WMD of KMA as they undertake their day to day operation and maintenance activities at the site. The treatment facility supervisor reports to the monitoring team at the WMD of KMA. Duration of management contract between the stakeholders is five (5) years and can be renewed based on performance. A representative from WMD of KMA reports that if performance is less than expected, retendering is made to allow other private operators to bid. He also recorded that eighteen thousand Ghana cedi is paid to J. Stanley Owusu Company every month. An interview with the PO's representative however revealed some of the challenges faced by the company. A trip to the site saw how full the

anaerobic ponds were and the blockage of underground pipe network. This is because there is no equipment to empty or de-silts the ponds; though there are good people with technical know how to operate on the equipment. The challenge was attributed to lack of funds and its associate delays and so on.

4.7 Factors affecting the existing public-private partnership in faecal sludge collection and treatment

4.7.1 Financial Issues

Interview with officers revealed that, involvement of POs in the management of faecal sludge has resulted in financial sustainability in KMA. The officers cited that the partnership has ensured operating efficiencies and cost recovery.

However finances for operation and maintenance of the treatment plant are brought from the government common fund but the operator complains bitterly about its delay and how the delay affects operation and maintenance of the whole treatment system. Blockages of the ponds are attributed to the fact that funds are not readily available to maintain the ponds. However private operators in charge of the plant's management are motivated from the eighteen thousand Ghana cedis brought from the Assembly at every monthly.

4.7.2 Technical factors

Technical issues have got to do with efficient functioning of system components such as equipment, materials, processes etc. It is also linked to the ability to manage and operate the facilities to help with the efficient operations and maintenance of the scheme. All the above are affected by the technology, age and condition of the facility. Other technical issues according to the contract are related to the performance indicators for maintenance. The private firms however disclosed their difficulties with the technical system especially at the household (point of collection). One officer reported;

"With regards to collecting faecal sludge, getting access to septic tanks in some households during desludging was difficult due to poor planning of settlement. There are not cleared street linking to most of the household within the municipality**"**.

They indicated that suction tanker hose has to be rejoined before reaching the septic tank afar which delays emptying process coupled with traffic jam in the city during haulage to the treatment site. This affects collection companies in emptying more septic tanks per day as more time is spent on one household if this problem is unaccounted. This in effect causes householders to pay extra emptying fees.

It was revealed on field visit at the treatment plant that, ponds for sludge treatment are virtually full and sludge movement into the subsequent chambers was quite difficult. Interview with the manager at the Dompoase treatment site representing KMA revealed financial constraints as the main factor accounting for the current state of management of the system. This is affecting the day to day operational efficiency of the system. According to the operation and management, this is a major technical setback which is impeding operations and management of faecal sludge in the Metropolis.

4.7.3 Socio-cultural conditions

Sustaining the interest of private organizations in partnerships depends to some extent on the form of cooperation and support from the community. However, for a good community participation and cooperation of any scheme, there is the need for a serious consideration of the cultural and social aspects of the beneficiary communities. In the case of faecal sludge management, good community participation (employment of qualified community members) will provide support for the operation and maintenance of the system without interference.

The private companies interviewed in this study however disclosed that their activities are not being impeded by the socio-cultural conditions at their places of operations. They

indicated the level of support and acceptance received from the community leaders in their operations. This they indicated has been helpful in sustaining the partnership they have with the Assembly in this regard. Moreover, the manager revealed that the community is far from the site with not less than 100m apart and with tree plantation cultivated around the treatment site to prevent any odour from entering into the nearby community.

4.7.5 Legal conditions

Legalities are a major component of partnerships. Partnerships are built on mutual understanding of roles to be played by each partner and this is backed by legalities to ensure each party plays its part towards the achievement of a common purpose and sustaining the partnership. The private companies which are involved in both the collection of feacal sludge and the maintenance of the faecal plant indicated that their activities are based on a formal contract with the Assembly. This they indicated spelt out their key responsibilities and also the form of support from the assembly. This they indicated has been very key to how far they've come with their partnership.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1 Conclusion

Faecal sludge collection

From the study,faecal sludge collection was done using two different methods namelyvacuum suction trucks and manual collection method. Both public and private partners involving infaecal sludge collection from households and public toilet in Kumasi Metropolitan Area used vacuum suction trucks and manual collection approach. However, Asante Akim North Municipal Assembly used only vacuum suction truck method in collecting faecal sludge.Seven public institutions and twenty-three (23) private companies were identified to be involved in the collection of faecal sludge in Kumasi Metropolis.

Private partners play a key role in collecting faecal sludge in Kumasi metropolis. 77% of the quantity of sludge collected to the treatment site is done by the private companies in KMA.

The study revealed that, involvement of private partners has led to competitive market thus taking the place of monopoly for faecal sludge collection and has indeed helped to reduce the charges placed on collection comparing with previous years when there were no private partners in faecal sludge collection. It has also resulted in the use of new expertise and gaining of access to increased capital for the purchase of suction trucks in the area of collection, bringing good returns to the private operators. This has led to service expansion to many areas within the Kumasi metropolis where previously was without service.

It was again revealed in the study that getting access to septic tanks in some households during desludging was difficult since there are no cleared streets linking most of the household within the municipality due to poor planning of settlement. This is a challenge to both partners in faecal sludge collection.

The public partner (KMA) however regulates the activities of the private companies involved in faecal sludge collection by registering and issuing licenses to them. It revokes the licenses of private operators who do not follow regulations.

Faecal sludge treatment

The study revealed that, the faecal sludge treatment plant at Kumasi was put up by KMA in 2004.It is managed and maintained by a private firm called J. Stanley Owusu Company under a management contract in partnership with KMA. The duration of the contract is five (5) years subjecting to renewal based on performance of the private partner. The private partner is monitored and supervised by facility treatment supervisor from WMD of KMA as they undertake their day to day operation and maintenance activities at the site.

The public partner (KMA) is mandated to pay the private partner for operation and maintenance of the facility however; the money is not promptly received.

The study however identified that, Asante Akim North Municipal Assembly have not yet explore the use of private partners in the areas of faecal sludge collection and treatment. They thereby undertake collection and treatment activities on its own. The study as well disclosed that faecal sludge collected by the assembly is disposed into non engineered treatment plant which can negatively impact on the environment.

5.2 Recommendation

Based on the above conclusion the following recommendations are given:

There should be a proper planning of future settlement by city authorities to Link Street to most household within the municipality to facilitate easy access to septic tanks in most households in the city during desludging.

Also, a research should be conducted on an innovative way of desludging faecal sludge from inaccessible faecal sludge facilities from communal and households. For instance the use of emptying technologies like Vacutug, MAPET and MDHP as discussed in chapter 2.The monthly payment that the public partner (KMA) should pay to private partner (J. Stanley Owusu Company) by contract agreement for operation and maintenance of treatment plants should be promptly paid in order to sustain the partnership.

It is again recommended that KMA should encourage private companies or individuals as in the collection services to come on board to be in partnership to have more of the treatment plant within the metropolis. Once there is only one private operator involving in the treatment of faecal sludge in the only treatment plant in the metropolis it will result in monopoly and there would not be no competition in the treatment service.

It is however, recommended to Asante Akim North Municipal Assembly to explore the use of private partners in the construction of relatively small engineered treatment plant based on the frequency and quantity of sludge collection in the municipality. This will help to reduce environmental pollution at the dumping site.

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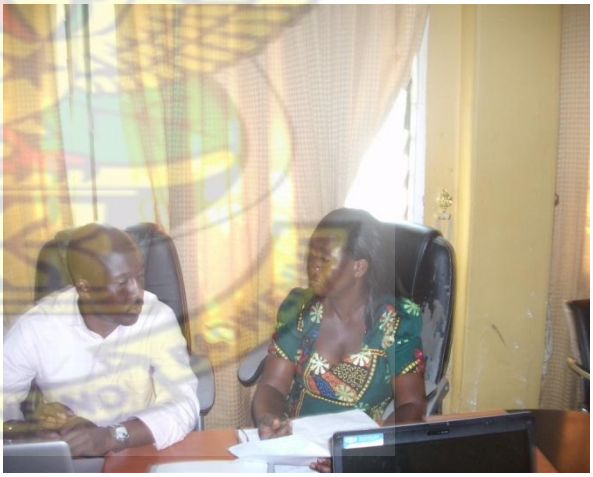
APPENDICES

APPENDIX 1: (PLATES)

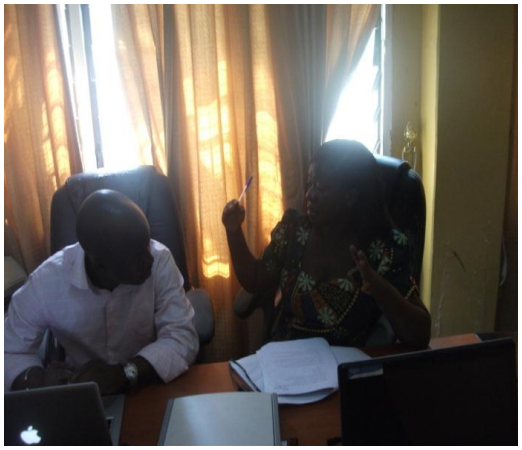
Interview with a member of environmental &Sanitation staff of AANMA

Interview with the boss of environmental &sanitation department of AANMA

Interview with Environmental & santation OfficersAANMA.



Interview with a representative of WMD bose of KMA




Interview witha representative KMA boss at WMD at KMA


Dompoase treatment plant

AANMA's final disposal site

Site visit to AANMA's final disposal site

Manual suction truck used at KMA

Damping site at KonongoOdumasi

Vacuum suction truck offloading FS at Dompoase treatment site.

Vacuum suction truck used in collecting faecal sludge

Vacuum suction truck offloading FS at Dompoase treatment site.

A typical household septic tank with vent pipes showing

APPENDIX 2

(TABLES)

Estimated population growth for the period 2000 to 2011 Kumasi Metropolitan Assembly andAsante Akim North Municipal

Years	Kumasi Metropolitan Assembly	Asante Akim North Municipal
2000	1233464.6	130271
2002	1300071.7	134179
2003	1370275.5	138205
2004	1444270.4	142351
2005	1522261.0	146622
2006	1604463.1	151020
2007	1691104.1	155551
2008	1782423.7	160217
2009	1878674.6	165024
2010	1980123.1	169975
2011	2079129.2	175074

Source: field survey 2012

Sources of Water

TYPE OF WATER FAC.	PERCENTAGE	(%)	(%)
	RURAL	URBAN	Total (%)
Pipe borne	1.5	0.7	2..2
Borehole	30.0	11.5	41.5
Stream	22.1	16.1	38.3
Well	8.0	9.6	17.6
Others	-	0.4	0.4
Total	61.6	38.3	100.0

Source: Survey Task Team

Volume of Liquid Waste in the Sub-Districts

SUB DISTRICT	**POPULATION**	**LIQUID WASTE**	
		EXCRETA (Litre/day)	**URINE (litre/day)**
Konongo/Odumasi	48,990	6,711.63	67,067.3
Agogo	38,882	5,326.8	53,229.5
Juansa-Domeabra	11,768	1,612.2	16,110.4
Dwease-Praaso	10,308	1,412.2	14,111.7
Total	109,948	15,062.8	150,518.9

Source: Office of the Municipal Health Environmental Officer

Population coverage of toilet facilities at KMA

Toilet facilities	Population Covered	Coverage (%)
KVIP	172765	11.7
Enviro. Loo	87134	5.9
Pit latrine	15023	1.0
Bucket latrine	18028	1.2
Aqua privies	578389	39.3
WC's and Septic tanks	375577	25.5
Sewer Line (wc's+sewer)	225346	15.3
Total	1472262	100

SOURCE: GSS 2000

Excreta Disposal facilities available at KMA

Toilet Facilities	Coverage (%)
Aqua privies	51
Pan latrin	1
Water Closet To Sewer/Septic Tank	25
Enviroloo	7
KVIP	16

SOURCE: KMA WMD (2009)

Facilities used at asanteakim north municipal area

Toilet facilities	**Quantity**	**Coverage (%)**
W/C	204	14.2
KVIP	203	14.2
VIP	501	35.0
STL/AQUA	30	2.1
PIT LAT	478	33.4
PAN	14	1.0
ENV.LOO	3	0.2
	1433	100.0

Source: AANMA (2011)

FaecalSludge Collection at KMA

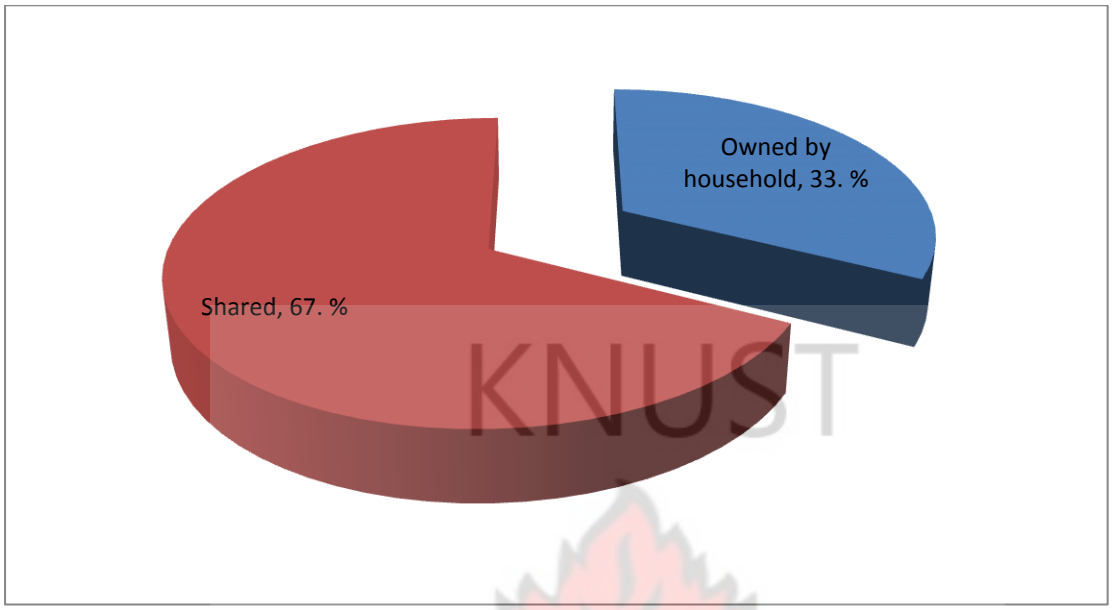
Year	POPULA	No of Col. Comp	Trips made by public (yrs)	Trips made by private (yrs)	FScollected (KMA)	FSgenerated (m^3)	quantity collected by:	
							public	private
2004	1444270	17	2202	7236	**47193.73**	**51993.73**	11011.87	36181.86
2005	1522261	17	2328	7650	**49891.4**	**54801.4**	11641.33	38250.07
2006	1604463	24	2462	8089	**52756.67**	**57760.67**	12309.89	40446.78
2007	1691104	28	2597	8532	**55645.75**	**60879.75**	12984.01	42661.74
2008	1782424	28	2741	9006	**58736.25**	**64167.25**	13705.13	45031.13
2009	1878675	23	2495	8198	**53465**	**67632.29**	12475.17	40989.83
2010	1980123	28	3063	10065	**65639.43**	**71284.43**	15315.87	50323.56
2011	2079129	30	3225	10597	**69113.65**	**74848.65**	16126.52	52987.13

Faecal Sludge Collection at AANMA (Off-Site)

Year	FSG	Total Number of Trips (yrs)	Quantity of Sludge Collected (m^3)	Uncollected FS
2004	5124.635	369	1845	3279.635
2005	5278.374	417	2085	3193.374
2006	5436.725	438	2190	3246.725
2007	5599.827	462	2310	3246.725
2008	5767.822	507	2535	3289.827
2009	5940.857	528	2640	3232.822
2010	6119.082	552	2760	
2011	6302.655	582	2910	

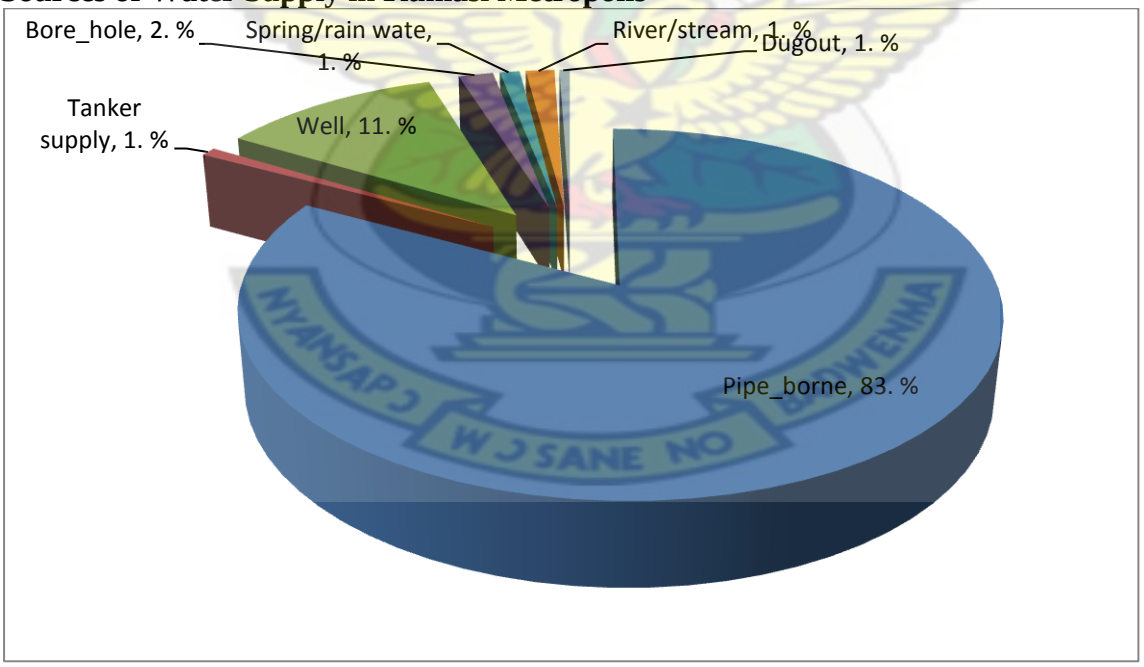
APPENDIX 3

Households with Toilet Facilities in Kumasi Metropolis.



(Source: 2000 Population and Housing Census, 2000)

Sources of Water Supply in Kumasi Metropolis



(Source: Population and Housing Census, 2000)

APPENDIX 3

(INTERVIEWS WITH STAKEHOLDERS)

1 INTERVIEWS WITH THE METROPOLITAN, MUNICIPAL AND THE DISTRICT ASSEMBLY (MMDAs) UNDER STUDY.

Location data on the 3 MMDAs under study – Demographics, socio-economic, district and study area maps.

COLLECTION

1. Is there apartnership process between the Assembly and the collection companies? Is it formal?
2. What type of contract exists in the partnership arrangement?
3. What are the various toilet facilities available in Kumasi:
    a. Water closet=
    b. Aqua privies=
    c. KVIP =
    d. Bucket latrine =
    e. Enviroloo
    f. Free range or bush
4. How many collection companies are available in Kumasi?
    a. private =
    b. KMA =

    INSTITUTIONS

    c. UEW-Kumasi =
    d. KNUST=
    e. KATH =

f. Other

5. What type of technology is used in faecal sludge collection (Trucks,Sewer lines)
6. What financial resources are available in the collection FS.
7. What are some of the problems faced in FS collection?
8. How much excreta is generated in Kumasi per population per month?
9. How much faecal sludge is produced in Kumasi per day from:
    a. Sewer lines=
    b. Septic tanks=
    c. Heavy sludge=
    d. Bush =
10. What is the average monthly trip of the various collection companies?
11. What is the capacity of the various vacuum suction trucks for service provision?
12. What is faecal sludge flow in Kumasi from 2008-2010?
13. What are some of the legal issues that factor in the collection and dumping of sludge?
14. Do the MMDAs have bylaws on collection and dumping of FS and how are they enforced?
15. What are the newly introduced legislations, regulations and policies in the sector with regards to faecal sludge collection and dumping?
16. Are collection entrepreneurs free from taxes on imported goods such as vacuum trucks and truck spare parts?

TREATMENT

1. Is there formal contract between the Assembly and the Private Operators in faecal sludge treatment in the partnership process?
2. What type of contract exists in the partnership arrangement?
3. What is the scope of the contract (maintenance of system, extension, rehabilitation etc)?
4. What prompted the partnership and how has the partnership developed over time (duration)?
5. What facilities are available for treating waste e.g. on –site and off site treatment?
6. Do all the faecal sludge produced by all theavailable toilet facilities end up at the faecal sludge treatment plant? How much is dumped into the environment untreated?
7. What are the existing sewerage network system and faecal sludge produced by each?
8. What is the capacity of both the Assembly and the Private Operator in the treatment of faecal sludge?
9. Was the treatment system in good order before the takeover by the PO?
10. What are the various technologies used in faecal sludge treatment in Kumasi (waste stabilization ponds, others)
11. What financial resources are available for faecal sludge treatment?
12. What are some of the legal issues that factor in the treatment of faecal sludge?
13. How does the Assembly seek to promote a good partnership relationship in faecal sludge treatment?
14. What are some of the performance outcomes in this partnership relationship?
15. Has any change in government, laws/policies affected the performance of the partnership?

16. Do the MMDAs have bylaws onpartnership and how are they enforced?What are the newly introduced legislations, regulations and policies in the sector with regards to faecal sludge treatment? Is each party capable of its responsibilities? How are responsibilities shared among the Assembly and the Private Operator in the treatment system?

INTERVIEWS WITH THE COLLECTION COMPANIES / CESSPIT EMPTIERS

1. What capacity of vehicles is availableforfaecal sludge collection?
2. What are the factors that hinder effective and efficient functioning of the system equipments and processes?
3. How many people are involved during desludging of faecal sludge and what protective clothes and gears are in place for the operators?
4. Are collection entrepreneurs free from taxes on imported goods such as vacuum trucks and truck spare parts?
5. Is there availability of suitable treatment sites for dumping and how close is the site to your working vicinity?
6. Do you have easy access to toilet facilities to desludgingfaecal sludge? (septic tank, public toilet etc)
7. How much is paid for collection of sludge as well as paying for tipping of sludge?
8. Where else do you dump the collected faecal sludge apart from the official dumping site?
9. What are the general problems encountered and what do you think if done will improve upon FS sludge collection service?
10. Have new technologies been used by your organization for collection of faecal sludge?

INTERVIEW WITH PRIVATE OPERATOR AT DISPOSAL/TREATMENT SITE

(DOMPOASE)

1. How long has the disposal site been in operation and how long have you been working at the disposal site?
2. What are the processes involved in treating faecal sludge at the treatment site?
3. Who supervises the activities at the site and whom do you report and account to?
4. What are the factors that hinder effective and efficient functioning of the system equipments and processes andthe major problems you face at the site?
5. How have the cultural values/practices in the community affected the service delivery?
6. What is the frequency of dumping (desludging) andwhat Quantity of sludge is dumped/tipped (based on the capacity of the vehicle) per year?
7. What are the charges for the different capacities of cesspit emptying per dump and are the charges able to cater for all O & M activities at the treatment plant? Are you capable of discharging your responsibilities?
8. What processes do the faecal sludge go through at the treatment plant?
9. How do you see the partnership relationship with the KMA as far as faecal sludge treatment is concern?