Collection and Disposal of Solid Waste by Private Companies in Ghana

A Case of Zoomlion Ghana Limited in The Sunyani Municipality

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This document represents part of the author's study programme while at the Institute of Social Studies. The views stated therein are those of the author and not necessarily those of the Institute.

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List of Acronyms

ISS	Institute of Social Studies
EPA	environmental Protection Agency
GSS	Ghana Statistical Service
GIM	Ghana Innovation Marketplace
UN	United Nations
PPP	Public Private Partnership
NESPOCC	National environmental sanitation policy coordinating council
GHS	Ghana health service
MOH	Ministry of Health
GES	Ghana Education Service
MES	Ministry of Environment and Science
MMDAs	metropolitan municipal and district assemblies
CSIR	Council for Scientific and Industrial Research
PWD	Public Work Department
JHS	Junior High School
SHS	Senior High School
GH¢	Ghana Cedis
MEHA	Municipal Environmental and Health Analyst
HES	Head of Environmental and Sanitation
EGSSAA	Environmental Guidelines for Small Scale Activities in Africa
WHO	World Health Organization
ACARP	Accra Composting and Recycling Plant
ZL	Zoomlion Limited
WMD	Waste Management Department
CCW	City and Country Waste
LG	Local Government
CG	Central Government

Abstract

Solid waste collection and disposal poses a serious developmental challenge to many governments in developing countries of which Ghana is no exception. In a concerted effort to tackle this challenge has necessitated the involvement of the private sector to partner with governments.

It is imperative to state that the involvement of the private sector has not seen any drastic improvements in the management of solid wastes. An assessment of Zoomlion Company, a private solid waste management company in the Sunyani Municipality in the Brong Ahafo Region of Ghana has amply testified to this phenomenon. This study was conducted with a sample size of 76, consisting of 40 residents from non-residential areas, 30 from residential areas and 6 officials selected from both the Municipal Assembly and Zoomlion Company. A mixed method research design involving questionnaire, interview and observation was used in the data collection. The research revealed that sole-sourcing does not promote effectiveness and efficiency in any developmental agenda such as solid waste management. This is due to the fact that the selection of the Zoomlion Company was not done through any rigorous competitive bidding. It was revealed that the collection and disposal practices in the Sunyani Municipality was far from being appropriate due to certain inappropriate collection and disposal practices such as insufficient human and materials resources, people's attitude towards sanitation practices and the sanitation workers, and lack of knowledge or education on waste management as a whole. In a bid to ensure practical improvement in solid waste management in solid waste management in the Sunyani municipality, the study has recommended that the Assembly should award contracts with due recourse to the Public Procurement Act (Act 914) of 2016.

Finally, the Assembly should, among other measures expedite actions on intensifying regular supervision and periodic public education on solid waste management in order to ensure effectiveness and efficiency for a better health for the residents.

Relevance to Development Studies

Formally, Governments in most of the developing country were responsible for providing all public services to their citizens. Due to the high rate of development, some of these public services have been awarded to the private sectors in a form of partnership, with the reason being that the private business can help better the service.

Certain central Governments have partner the private sector to manage solid waste where the central Government becomes the principal and the private sector acts as an agent. Here both parties have a role to play to ensure effective outcome. The government being the principal in the agreement contract have failed to play it role well due to corruption, poor supervision and other factors. The institutions that are created to oversee the activities of the private sectors are lacking the appropriate mechanism that can monitor the private sectors activities as written in the contract.

The private sector has failed to play it role as agent due to it political relationship with certain government authorities, and corruption. This research paper is throwing more light on the private sectors involvement in collecting and disposing of solid waste.

Keywords

Private companies, solid waste, Zoomlion Ghana limited, public private partnership, private sector

CHAPTER ONE

INTRODUCTION

A. Background of the Study

Waste products occur as of our habits of life, and it is produced at each point of production and development. According to Oyelola, et.al solid waste happens in all phases of human activities, from manufacturing to consumption (as Cited in Otchere, Anan & Bio, 2015: 1). Managing solid waste has become a global issue as most countries in the world are now faced with waste management related challenges (Wilson et al., 2006). Especially, most of the health and environmental problems in certain African cities are attribute to improper solid waste management (Achankeng, 2003).

Cointreau-Levin (1994) also notes that solid waste had become a tract to the developing countries, by stating that the output per the unit of solid waste generated in the developing countries is greater than the output generated in the developed countries due to the incompetency's of industrial activities. These Solid Wastes according to Abagale, et.al (2012: 18) are generated in different forms in every aspect of human life which are discarded as unwanted. Such unwanted materials come in the form of newspapers, broken bottles, aluminium cans, flower trimmings, food leftover, etc. "The total stream of waste generated within a community is often categorised into municipal waste, industrial waste, constructional and demolition waste" (Otchere et al., 2015: 28).

In Africa, several factors contribute to high rate of solid waste generation. These include the negligence of the local government authorities with the responsibility to manage solid waste, the issue of finance and poor commitment on the part of the citizens to deal with solid waste (Awortwi, 2003). Factors such as "poor service coverage, irregular sloid waste collection, solid waste spill over from bins, and the careless attitude of citizens towards indiscriminate disposal on unlawful places, and waste littering" have been attributed to the problems of solid waste generation especially in the developing countries (Zurbrugg, 1999: Onibokun and Kumuyi, 1999; Oduro-Kwarteng et al., 2006 as cited in Oduro Kwarteng, 2011:2).

"Governments in the developed and developing countries have been charge with the responsibility of managing solid waste management services such as solid waste "collection, transfer and disposal, and among others" (Puopiel, 2010:1). These solid waste services have been contracted to governmental agencies and or private companies (Puopiel, 2010:1). Even though, "20 to 40 percent" of state's expenses are allocated for managing waste services in the developing countries, city authorities in these countries are still not able to manage the increasing problems of solid waste" (Zerbock, 2003: as cited in Puopiel, 2010:1). Although the "World Health Organization(WHO)" after asking African leaders to place in order their environmental health issues, the research indicated solid waste as the second major problem after safe water management (Senkoro, 2003; Zerbock, 2003: as cited in Puopiel, 2010:1). To overcome these challenges, governmental laid down policies on solid waste management have been brought on board to solve the problem of poor solid waste management in Africa (Akinamo and Ben, 2013). As a result of the continual increase of solid waste generation and its associated challenges and the inability of the state governments to manage solid waste properly, an alternative means of involving the private sector in managing solid waste became an option for many developing countries including Ghana.

However, the participation of the private sector in solid waste collection started gaining momentum in the 1990s in most developing countries. Such participation can be in the form of total provision of waste management services or a partial one that will also involve the public sector (van Dijk, 2008). This includes but not limited to solid waste collection, disposal, sanitary landfilling, recycling, and to resource recovery (Oduro-Kwarteng and Van Dijk, 2013). The involvement of private sector in the provision of public services has been promoted as an alternative or solution to deal with government failures in providing quality service for the populace. Alt-hough, the measures of the private sector to address the market failures connected to the "public good" nature of solid waste services, the public sector is becoming the buyer on behalf of the citizens, and the private sector as the provider of public goods (Oduro- Kwarteng and Van Dijk, 2013 as cited in Wiafe, 2014: 18). In spite of the private sector involvement in managing solid waste services over the past years in developing countries, issues related to solid waste problems still exists, making it burdensome for the governments and city authorities irrespective of their efforts (Onibokun and Kumuyi, 1999: as cited in Oduro-Kwarteng, 2011: 2). The problem associated to solid waste as suggested

by Oduro-Kwarteng are "irregular solid waste collection, solid waste littering, inadequate service coverage, spill over of solid waste from litre bins and storage containers, and the lackadaisical behaviour of citizens toward improper disposing on unlawful places" (Zurburgg, 1999; Onibokun and Kumuyi, 1999; Oduro-Kwarteng et al, 2006; as cited in Oduro-Kwarteng, 2011: 2).

Over the years, there have been various studies that looked into the private sector's involvement in solid waste management in developing countries. Examples of case studies are India (Post et al., 2003), Tanzania (Kassim and Ali, 2006), Kenya (Karanja, 2005), Ghana (Obiri-Opareh and Post, 2002; Awortwi, 2003) just to mention a few. Considerably, all these studies revealed that despite the improvement in coverage with service extended to those areas that are neglected regarding waste collection. They also show that there are still series of unresolved challenges that are deeply embedded in the policy and performance of the private sector. Similarly, a recent study by Oduro-Kwarteng and Van Dijk (2013) also shows that the private sector still encounters difficulties of low quality regarding services rendered with a high level of inefficiency. However, Public Private Partnership (PPP) is of many types and has been adopted by several developing countries. For example, in Lebanon the strategy is used in regulating private markets for solid waste collection (Massound, 2003), in India PPP is a variable approach with communities-based organizations for managing urban waste Goel (2008), Rathis, (2006) Aliu et al. (2014) that Kenya has used PPP to overcome the challenges of political interference in waste management and inadequate funding in waste collection (as cited in Henry et al. 2006). Public Private Partnership in Ghana is characterised by a lack of enabling legislation to deal with the offenders, non-commitment posture of the waste management workers, education and corruption (Achi et al. 2012). On the other hand, all these studies ignored to adopt a critical framework and indicator to assess the performance of the private involvement. One can only argue that the private sector has failed or performed if the performance assessment was done strictly based on the existing modalities and structure of the private sector involvement in the waste collection and disposal in the particular area of research. What appears to be ineffective might be in reality a successful intervention of the private sector based on the terms of an agreement that the contract, concession, and franchise were agreed upon.

It has been proven that the government cannot single handily deal with the problem of solid waste disposal, and the private sector has also failed to serve the low-income household efficiently. Therefore, this study will focus on the perspectives of households (both high income and low income), private sector service providers, and the government on the possible solution to the mounting problem of solid waste collection and disposal services offered by both formal and non-formal private sector in Sunyani Municipal of Ghana. Since the households are renowned to be the primary generator of solid waste and also the main customers for the solid waste collection and disposal services, it is imperative to identify with their analysis of how best the waste service provided can be improved. This will enable us to understand the relationship between the household and those that provide waste service, their behaviours and attitudes towards the government and the formal private sector about payment and demand for service.

B. Problem Statement

Up until the 1990s, municipal solid waste management was the sole responsibility of the Municipal Waste Department established in 1985. Collection and disposal of waste in Ghanaian community is a tough task as a result of increase in the population and the continuous rural- urban drift of citizens. In Ghana, the issue of Solid Waste Management is not of high priority as compared to social problems such as poverty and unemployment, economic and trade-related issue, health and education to mention a few. For example, in the Sunyani Municipal District 2012 fiscal year expenditure summary, a total of GH¢141,200 from GH¢3,553,437 was paid for solid waste management services (Sunyani West Assembly, 2012). Unfortunately, despite the increase in expenditure in 2013, money spent on waste management fell to GH¢140,000 out of the total expenditure of GH¢8,573,569 (Sunyani West Assembly, 2013). The aftermath effect of the inability of the Sunyani Assembly to prioritised solid waste management in its policy, the city that was adjudged as one of the neatest in Ghana has been experiencing pitiable solid waste collection and disposal which has resulted in environmental sanitation problem. The problem here is, like many other Ghanaian cities, the Metropolitan, Municipal and District Assemblies (MMDAS), the Sunyani Municipal has engaged the services of the private company known as Zoom Lion Ghana Limited to manage solid waste. Under the private sector management system of solid waste, the com-

pany register the household who have the ability to pay every month for bins and collect their solid waste every three days. The poor households which do not have the means to register for the bins still pile up their waste and either burn or throw it into the open space provided by the assembly (Amoah, 2014:111). Evidently, this system of managing solid waste is still leading a continues to pile up of waste in the public space. As an effect, this has caused the scattering, piling, heaping and spilling over of storage containers with solid waste in the Sunyani municipality, particularly in the low- middle neighbourhood and area in the outskirt of the city (Puopiel, 2010:2). The current increased in the usage of "polythene bags" to package goods has worsened the solid waste problems in the municipality, making the environment dirty and unhealthy for living. These conditions have also increased the spread of cholera and typhoid, especially among those people living in unpolluted areas (Puopiel, 2010: 2). Therefore, this study focuses on the collection and disposal of solid waste in Ghana; a case of Zoomlion Ghana Limited in the Sunyani Municipality.

C. Research Questions

1. How does the private sector get involvement in the collection and disposal of solid waste in Sunyani Municipality?

2. What form of solid waste are generated and how are they kept a before collection in the Sunyani Municipality?

3. What are the modes of collection and how frequent is the solid waste collected and disposed off in the Sunyani Municipality?

4. What are the practices of solid waste collection and disposal in the Sunyani Municipality?

5. Are there enough resources for effective collection and disposal of solid waste in the Sunyani Municipality?

6. What challenges hinder the collection and disposal of solid waste in the Sunyani Municipality?

D. Justification and Relevance

Solid waste collection and disposal as a key developmental challenge in Sunyani Municipality in recent times does not need only the attention of the municipal Assembly but should also involve all the solid waste management institutions including the corporate organisations and residents to help solve this permanent problem. This is because, it has a lot of repercussions on the human resource that could lead to the spreading of disease epidemic, poor sanitation, low productivity, and loss of lives as it happened in Accra. From June 2014 and February 2015 the Greater Accra Region recorded over 20,500 cases of cholera[1]. Again, it has also reported that improper disposal of refuses was one of the leading causes of perennial flooding in the country[2].

It appears that the existing system (private sector management) are unable to solve the existing generated solid waste problems in the Sunyani Municipality. There are a lot of interventions put in place by the government to curtail this preventable problem. One of such intervention is the introduction of National Sanitation Day to support the collection and disposal of solid waste which takes place every first Saturday of the month. Even with the introduction of the National Sanitation Day to bring all citizens on board to clean the towns and cities, the problem persists in the most of the country including Sunyani Municipal. In spite of this huge problem, the Sunyani Municipality has recorded a few study on solid waste collection and disposal. It is therefore, worth to assess the performance and practices of the private sector in the collection and disposal of solid waste in the municipality.

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[1] Agyeman, K. (2015). Accra recorded 20,500 cholera cases from June 2014 to Feb. 2015. <http://citifmonline.com/2015/03/20/accra-recorded-20500-cholera-cases-from-june-2014-to-feb-2015/ >date accessed 20th august,2016

[2] Addei, I. (2016). Causes and effects of flooding in urban centres in Ghana. <http://www.graphic.com.gh/features/opinion/causes-and-effects-of-perennial-flooding-in-urban-centres-in-ghana.html> date accessed 20th august,2016

E. Limitations of the Study

As usual, the study of this nature must have its limitations. The most significant limitation of this study was the fact the study was limited to only Zoomlion Company Limited. Therefore, the views and findings may not represent the views of other private waste management institutions in Ghana who might be operating in different demographic areas. Few of the respondents especially from the non-residential areas requested for money from answering the field questions. Some Key participants felt reluctant to give vital information and documents to support the findings. These in a way made the administration of questionnaire and interview quite difficult which in some way may have affected the study.

F. Organization of the Study

This research consisted of six chapters. The chapter one of the study presents the introduction of the study. It has also to some extent, analysed the problem in Sunyani Municipality. Chapter two and four touches on the re-view of related literature and theoretical framework of the topic under study by discussing the concept, methods and processes of collecting and disposing of solid waste. Chapter three focuses on the methodology for data collection. This includes the research design, the study population, and sampling procedure, instrumentation, data collection procedure and the data analysis procedure. Chapter five presents the data and the analysis of the result. Chapter six focuses on the summary of the research findings, conclusions, and recommendations and suggestions for future studies.

CHAPTER TWO

MODALITIES OF PRIVATE SECTORS INVOLVEMENT IN THE COLLECTION AND DISPOSAL OF SOLID WASTE MANAGEMENT SYSTEM

A. Private Sectors Involvement in Solid Waste Collection and Disposal

The private sector is now usually acknowledged and accepted in the public sector management. In a review of Osborne (2000: 1), the establishment of public-private partnerships (PPPs) is now a key mechanism of public policy across the world. Even though, UN-Habitat posit that there is a conceptual misunderstanding of the term "privatisation" concerning private sector participation in municipal solid waste service delivery (Wilson, D.C., et al 2012). Therefore, privatization is understood as a way of giving public services or control to private entities either through a contractual or franchised agreement[3]. As some understand it as contracting responsibilities to private sector firms while the Local Government maintains the overall supervisory and regulatory control, others take it as "commercialisation" of municipal services while others understand it as a full transfer of responsibilities to private sector firms who set their rules (Wilson, D.C., et al 2012).

Privatisation is also viewed as lessening government responsibilities or ownership in a given service or industry (Cointreau-Levine, 1994). According to Cointreau-Levine's understanding of privatisation, he categorises it into contracting, concession, franchise and open competition.

The privatisation of solid waste collection and disposal service delivery worked out in various forms in different countries in Africa. For instances, in Ghana, privatisation reform was part of the political agenda since solid waste collection by

[3] http://www.lwvroguevalley.org/pdf_docs/privatization-study/LWV-privatization-definition.pdf

Waste Management Department (WMD) was 60% in early 1990s as compared with City and Country Waste (CCW), a joint Canadian-Ghanaian company 95 % service delivery (Aweso, 2013: 60).

The private sectors involvement in solid waste services emerged as a result of the local government accumulating financial problems and the public sector incompetence's in providing effective solid waste services (Wiafe, 2014:24).
According to Wiafe, (2014: 24) even though there are non-governmental failures, the underperformance and inability of the private sector will keep on repeating, if the required legislature, policies, incentives and government support are not in place. However, Awortwi (2004:214-215) was with the view that irrespective of the type of agreement an agency involved in, the fundamental rights should be spelt out. Therefore, he posits that when these rights are not spelt out right, it will lead to failure and ineffectiveness. He, therefore, outlines some fundamentals such as:

- The aim of the government in the private sector agreement
- The relationship between the principal and the agency in the agreement whether separated or inclusive affect the effectiveness of the agency performance
- To foster competition in practice at the LG level, it is necessary for central government (CG) to permit substantial local autonomy
- Monitoring, supervising and reporting should be an integral part of the agreement that would serve as a check for pre and post-contractual base.
- Local government competency is necessary for private sector performance
- Drawing upon various public administrative models serves as fundamental rules which guide politicians and bureaucrats as they undertake public duties.
- Effectiveness of private sector lies in "stakeholders" participation.

Private sector participation in solid waste collection and disposal services in developing countries is still faced with challenges (Wiafe, 2014: 25). Even though the government's intention to involve the private sector in the solid waste management is to promote efficiency and effectiveness as well as improving service quality, the necessary finance and expertise to bring this vision into reality are still issues to discuss (Baltey & larbi as cited in Wiafe, 2014: 25). Van Dijk (2008) added that the expected development in the solid waste service delivery had not been achieved yet. However, there are other private sector's involvement that have

been recommended in the developing countries to have achieved high efficiency and effectiveness in solid waste services (Cointreau-Levine, 1994; Cointreau-Levine
and Coad, 2000; Post et al., 2003 as cited in Wiafe, 2014: 25; Oduro-Kwarteng, 2011:6).

The effectiveness of the private sector in the solid waste collection has been subjected to greater effectiveness. The effectiveness of the private sector depends on some factors that are inside or outside the private sector's organisational settings (Oduro-Kwarteng, 2011: 9). Be that as it may, the underlying principles of private sector's involvement in solid waste services are attaining high efficiency in service delivery through cost reduction and providing effective and reliable services (public goods) to the public (Wiafe, 2014: 26). Even though, literatures on policy, technical, institutional dimensions and urban governance of solid waste management play a significant role in private sector's effectiveness and efficiencies, however, the researcher is of the view that the implementation strategies for solid waste management are the most important factors in theoretical frameworks, therefor this study's theoretical framework is centred on the theories of solid waste collection and disposal principles.

B. Modalities of the Private Sector's Involvement in Solid Waste

Solid waste collection and disposal is a public service aimed at delivering effective service to all citizens. It is not good to leave the public who do not pay unserved. Needless to say, solid waste management is a public good, and the local Government are responsible for it (Ahmad, 2003; 364). Involving private sector in the delivery of solid waste management comes in to reduce government activity, where existing delivery service is either costly or ineffective. Ideally, the private sector can be engaged in solid waste collection and disposal in four main ways (Ahmad, 2003; 364). Privatisation in general, according to Wiafe (2014) and Oduro-Kwarteng (2011) comes with different forms, contracting out, open competition, franchise and concession or leasing.

1. Contracting Out

In a public-private partnership, contracting out is when the government gives "a finite-term contract" to a private company to deliver solid waste management services (Cointreau-Levine, 2000 as cited in Wiafe, 2014:32). Such services could be collection of recyclables, street sweeping, transfer of solid waste at operational stations, disposal of solid waste to the final landfill, etc. however these contracts are given in a competitive bidding process. The private companies that win this contract are funded by the government for their service delivery. In the perspective of Dillinger (1994 as cited in Wiafe, 2014:32), "the services involve technological simplicity, low economies of scale, and moderate investment cost". However, it becomes an advantage for those private companies with uncertain financial resources. It also tends out to be less costly (Dillinger, 1994; as cited in Wiafe, 2014:32).

2. Open Competition

Under the public –private partnership, the government allows qualified companies to freely compete with other private companies in the solid waste management service. Under this modality companies privately negotiate with the individual households and make arrangements for the solid waste collection and disposal. In this agreement no company holds the zonal monopoly, therefore, everybody in the firm can compete within the zone (Cointreau-Levine, 2000).

3. Franchising

In the public sector, franchising is a contractual relationship between a licensor (franchisor) and a license (franchise) that allows the company owner to use the licensor's method in providing services to the public or consumers. In franchising there is "ownership of right", which is clearly outlined in the "franchise agreement"[4]. Franchisees are typically rewarded in a "competitive procurement pro-

[4] http://www.tetoncountyidaho.gov/pdf/additionalInfo/BoCC_Issue_Paper__5_-_Franchising_20141117.pdf

cess" that, however, includes negotiations. In franchising solid waste services to private companies, the active participatory role of government in solid waste collection and disposal reduces[5]. Under the franchise agreement, the billing is done by the firm under the franchise agreement. On the other hand, the local government may set out the rates and the franchise also charges the rate prescribed.[6]

4. Concession or leasing

A concession agreement is a grant of a right by the government or local authority, cooperation, individual or other legal entity[7]. Under the leasing or concession, the Municipal government delegates to the private sector the right to provide a service of which the government still retained some control over the management of the solid waste. According to Guislain and Kerf (1995) in the leasing agreement, the private sector managing the solid waste is responsible for its risk in the provision of the service including operating and maintenance of equipment, and infrastructure against the lease fee. In all these, the government or the local government grant the right but according to terms and conditions specified in the contract. However, the company is given freedom to choose the means of achieving the target. After the end of the lease agreement, the assets go back to the owner. Therefore, the private company does not have full ownership of the property, but whatever the approach may be, all concession must be accompanied by some form of regulation mechanism. It is also important to say that the key elements of concession regulatory framework are tariffs, degree of competition, interconnection regime and performance target.

C. Stakeholder of Solid Waste Collection and Disposal

The concept of stakeholders in the solid waste collection and disposal management system refers to all the individual, group, agency or organisation and government that has a stake, roles and interest about the collection and disposal

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[5] http://www.tetoncountyidaho.gov/pdf/additionalInfo/BoCC_Issue_Paper__5_-_Franchising_20141117.pdf

[6]http://www.tetoncountyidaho.gov/pdf/additionalInfo/BoCC_Issue_Paper__5_-_Franchising_20141117.pdf

[7]https://en.wikipedia.org/wiki/Concession

of solid waste. The municipal has the full responsibility for the solid waste collection and disposal services, and the citizens or households who use the system are usually the major stakeholders. In the case of private sector involvement in solid waste services, the principal stakeholders are the Municipal, the community and the private sector[8]. On the other hand, there are other actors who also have a significant part to play in the solid waste management according to their locality. For effective solid waste management, it is important to consider all the stakeholders in the planning of a successful strategy. Solid waste collection and disposal seems to work by fostering a constructive interaction with all the actors.

1. Municipality

The Municipal being the primary custodian of the solid waste collection is involved in many processes such as the separation of solid waste, collection, recycling/ composting, marketing, compacting and land filling (Joseph, 2006: 869). It is, therefore, the responsibility of the Municipal to ensure proper sanitation in the community by coordinating with other stakeholders in the community such as the NGOs and Sectoral agencies. The implication of this is that the responsibilities of awarding contract to the private firm falls on the shoulder of the Municipality.

2. The Community Role

The community forms the largest category of the stakeholders in the collection and disposal of the solid waste. They also have many roles to play in the collection and disposal activities. According to Joseph (2006: 867), the community serves as the "solid waste generators, service and information receivers", they are also the member of solid waste mobilisation. In a more detailed Joseph (2006:868), outline the role of community as:

- "Engages in separation of solid waste at source
- Good storage of garbage in the house or premises
- Uses official disposal sites when there is no door-to-door collection
- Set out the garbage at the agreed time and place
- Participate in activities to keep the environment clean.

[8] http://wasteportal.net/en/iswm/stakeholders-waste-management

- Encourage more re-use of waste materials within the household"

3. Private Sector Role

The private sector's potential role may be from the perspective of separation and, collection transport, processing and disposal of the solid waste (Joseph, 2006: 869). In the event of private sector involvement, the local government may spell out all the responsibilities in the performance-based specification and the contract regarding monitoring, collection, transport and disposal.

4. Other Stakeholders' Role

Joseph (2006: 863-871) maintains that there are other key actors like the environmental regulators, town and country planners, politicians, NGOs, media, the scientific community and all other financial institutions. According to him, Solid waste collection and disposal management system is an integrated system that should involve technical, financial, environmental and legal checks and balances procedures like "generation, source reduction, storage, handling, collection, treatment and disposal elements".

D. Efficiency and Effectiveness of Private Sector in Solid Waste Collection and Disposal in Ghana

It is assumed that private sector participation in solid waste collection delivery look out for the improvement of service efficiency and service effectiveness (quality). In fact, the assessment of private sector performance will be measured base on the productivity, service quality and profitability (cost recovery). However, the productivity is essential to private sector performances and has the "operational definition as the relation between output quantity regarding solid waste collected and input quantity collection vehicle", and other resources (Oduro-Kwarteng, 2011: 302). The combination of efficiency and effectiveness by the private sector in solid waste collection and disposal services will determine its performance.

In Ghana, the private sector has come under heavy criticism; many have questioned their efficiency and effectiveness in solid waste management. Truly, Post et al. (2003) are right to say the service effectiveness can be assessed regard-

ing reliability and frequency of collection. For instance, Oduro-Kwarteng, 2011:73) believes that "the private sector still faces challenging issues of inefficiency and low service quality due to certain factors in the partnership arrangements, and how company organizations are run".

Table 1 indicates the empirical evidence of effectiveness and efficiency of the private sector in solid waste collection and disposal in Ghana.

Table 1: Efficiency and effectiveness of Private sector in Solid Waste collection and disposal in Ghana

Reference issues	Case study year	Number of cities	Service quality and
Massoud et al. (2003)	India, Ghana 2003	2	Effective service, quality improved,
Awortwi (2004),	Ghana 2004	3	Effective service, quality improved
Oduro-Kwarteng (2011)	Ghana 2011	5	Effective service, quality improved,
Aweso (2013)	Ghana	1	High effective services, high quality delivery

Author's Review compilation

The review so far on previous studies suggests that the performance of private contractors in solid waste management, in general, is not so bad but still needs improvement in the planning and management. For instance, Massoud et al. (2003:24) conducted a study on the assessment of public vs. Private Municipal Solid waste management in India and Ghana and found the private sector to be effective in service delivery. In 2011, Oduro-Kwarteng's final thesis which he titled "private sector involvement in urban solid waste collection performance, capacity and regulation in the five cities in Ghana" also found effectiveness in private sector services. Bowan (2011: 89) in his study concluded that the private contractor in Wa Municipality is doing quite well in the storage, collection and transportation of solid waste but faces challenges with the treatment and final disposal. Again, Aweso (2013: 109) noted that Zoomlion Ghana also a private com-

pany has improved the solid waste collection in the Ablekuma Central Sub-Metropolitan area tremendously.

As part of the government's plan to fulfil its political agenda towards public-private partnership in Solid waste collection towards effective service delivery in the country, various private companies have been employed to manage solid waste in Ghana. In the case of Sunyani Municipality, Zoom-lion is responsible for the collection and disposal of solid waste.

E. Services and operational of Zoomlion Ghana Company

Zoomlion Ghana Limited (ZL), an organization of 88,000 employees consisting of 85,000 fieldworkers and 3,000 administrative staff, was set up in 2006 in Ghana as a solid waste collection company with its headquarters in Accra. "The company's vision is to develop and grow as the leading fully integrated private waste management company in Ghana, relying on their cooperation with their partners in the industry, their associates and joint venture partners, both national and international, now and in the future."[9]

The Company now operates integrated services like composting and recycling services (Accra Composting and Recycling Plant, ACARP), sewage treatment, janitorial services (Zoom Janitorial Services Ltd.), landscaping and beautification services, mobile toilet services (Zoom Cabin Ltd.), oil waste treatment (Zoil Services Ltd.) since 2006. [10] It is now functioning in 216 different localities across Ghana and has extended to other West African countries like Angola, Togo, Liberia and Zambia. According to Aweso (2013), apart from handling 70% of the solid waste in Ghana, it also provides waste transportation sub-contract services to competitors through its Zoom Alliance. The company's international relation is something that needs to be recognised. Zoomlion Ghana has international relations with TEDCOR (PTY) Ltd, a South Africa waste management company, Wasserman Pambilli also from South Africa, Nehlsen of Germany, Hubei of China, Ashock

[9] http://zoomlionghana.com/
[10] http://zoomlionghana.com/

Leyland and Mahindra truck companies in India. The company is now building the first industrial mechanical waste separator and composting facility in Ghana. [11]

According to zoomlionghana.com the company renders services such as "Tricycle Concept in public cleansing and pre-collection services; Solid Waste Collection (Door-to-Door, Communal Container. Heap Evacuation) Services; Liquid Waste (Septic Tank Emptying/Desludging) Services; and Public Cleansing (Street/Pavement Sweeping and Drain Cleansing) Services. Other services include Motorised Road Sweeping and Washing Services; Operation and Maintenance (O & M) of Landfill/Final Dump Site; Pest Control Services; Landscaping, Beautification and Horticultural Services; Local Assembly and Sale of Waste Management Equipment (Tricycles and Waste Containers) Services: Hiring and Leasing of Waste Management Vehicles and Equipment Services. In addition to Agency Representation and After-Sales Services for Waste Management Vehicles and Equipment; Capacity-Building and Training Services for Waste Management personnel (Managerial/Technical/Operational) (Aweso, 2013: 69).

CHAPTER THREE

RESEARCH METHODOLOGY

A. Overview

This chapter presents the research design, population, sample and sampling technique, instruments, validity and reliability of the instruments, data collection procedures, data analysis and ethical consideration.

[11] http://zoomlionghana.com/

B. Research Design

The sequential explanatory design which falls under mixed method research design was employed to assess the work of Zoomlion Ghana Ltd in the collection and disposal of solid waste in the Sunyani Municipality in the Brong-Ahafo Region of Ghana. The approach was supported by Creswell's definition of "mixed method research as cited in Wilson (2013) as the systematic integration of quantitative and qualitative methods in a single study for purposes of obtaining a fuller picture and deeper understanding of a phenomenon"[12]. The study design was structured into two phases; the quantitative phase followed by the qualitative phase. The first phase which involves the quantitative study was employed to collect primary data about the performance of Zoomlion in the collection and disposal of solid waste in the Sunyani Municipality through the questionnaire.

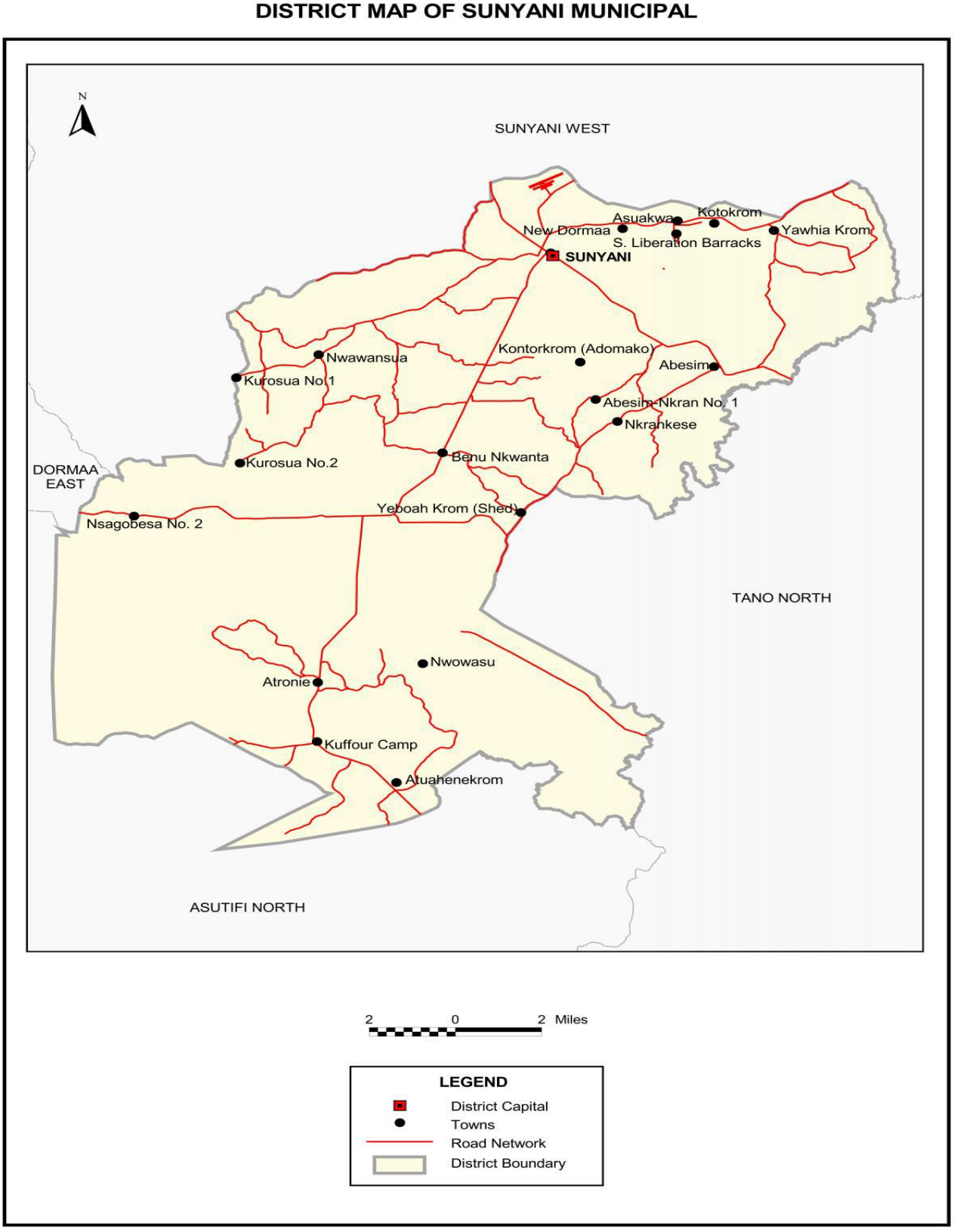
A qualitative study was employed in the second phase to ascertain the authenticity of the quantitative data collected in the first phase of the study. This assisted the researcher in verifying the monotonous responses and clarifying issues that cropped out from the questionnaire responses for critical re-examination

C. Setting

The study took place in the Sunyani Municipality. The study area is among one of the 27 administrative districts in the Brong Ahafo Region of Ghana. According to Ghana Statistical Service (2014: 1-4), the Municipal has a total land area of 829.3 square kilometres (320.1 square miles). The Municipality lies within the middle belt of Ghana with height from 750feet (229 meters) to 1235 feet (376 meters), the population of the Municipality stands at 123,224 with the growth rate of 2.5 percent (Ghana Statistical Service GSS, 2014:1.) Comparatively, the Municipality is densely populated, considering that the population density of the Region is 58.4/km2 and that of the nation of 103.4/km2. This has contributed to putting pressure on the available facilities. Notwithstanding the huge benefit derived from Urbanization; the municipal assembly is faced with the problems of poor and uncontrollable safe disposal of the solid waste system within the borders of the municipality. Environmental Protection Agency EPA (2004) observed that most

[12] https://ejournals.library.ualberta.ca/index.php/EBLIP/article/view/19571/15256

traders in the city use "polythene" bags popularly known as "Take away" to sell consumable products to consumers. After usage the consumers improperly dispose of them in the environment due to lack of dustbins at a vantage point. Similarly, satchel water commonly called "Nsu" is also thrown anyhow to public without proper disposal. Sunyani, which has been describing as the neatness city in Ghana, has now been decorated with an enormous amount of solid waste, and no measures have been taken by the city authorities to clean them up. The most common method of solid waste disposal in the Sunyani Municipality is dumping them in public containers which account for 52.5% of the total waste. About 17.4% of households use public dump (open space) and 10.7% of households burned their solid waste. House to house waste collection by the private waste management company accounts for 8.5 percent. A significant amount of the solid waste is deposited on the open ground. This enormous volume of waste is often located in hydrologically sensitive areas. When it rains, the waste runs into the water bodies that serves as a drinking water to some communities closer to the dumping site which poses a serious health threat to the surrounding communities, contributing to disease epidemics such as cholera, typhoid and several kinds of diseases. Below is the graphical presentation of Sunyani Municipal.



Map 1: Geographical area of Sunyani Municipality

Source: Ghana Statistical Service, (GIS);

D. Population

A "population" according to Creswell (2014: 204) consists of all the subjects you want to study. This implies that "a population comprises of all the possible cases (persons, objects, events) that constitute a known whole" (Kumar, A. 2002: 129). Since the focus of the study was to assess the performance of private sector's involvement in the collection and disposal of solid waste in the Sunyani municipality in the Brong-Ahafo Region of Ghana. All stakeholders of Solid Waste Management (Sunyani Municipal Assembly, Management of Zoomlion Company, Limited, Environmental Protection Agency (EPA) and individuals who generate solid waste in the Brong Ahafo Region became the population of the study. However, the target population for the survey of the study were mostly women between the ages of 20 and above. This targeted group were in charge of sweeping, gathering, and disposing of solid waste in the home, marketplace and other places. Few men were involved in the questionnaire survey since culturally; they were bound to perform such duties.

E. Sample framework and sample size determination

Since this population is vast 61,734 female populations from the age of 15 and above Ghana Statistical Service GSS, (2014) making a census or a complete enumeration of all the values in the population was impossible because of time and financial constraints. It is significant for the samples to provide a representative cross section of the community they purportedly represent. Therefore, in selecting the sampling purpose of this study, a sample size of 76 was chosen for the survey comprising of 40 from the non-residential areas, 30 from the residential areas and six officials for the qualitative data.

F. Sampling Technique

The study involved multi-sampling techniques. These were purposive, cluster, voluntary and accidental sampling techniques. The Sunyani Municipal was purposely selected because of the recent sanitation problem. The study area was divided into two (2) clusters with seven (7) community areas namely Non-residential

Areas (Penkwasi old Town, Penkwasi New site, Zongo Market, Zongo Town, Old Dormaa and New Dormaa) and Residential Areas (SSNIT and Airport Residential Area) due to the lack of census data on the cluster areas the sample size was shared in 4: 3 among the two group areas. However, voluntary sampling technique was employed to select the individual subjected to the study in each case. The accidental sampling was also used in addition to the voluntary sampling. This occurred when the researcher noticed a subject collecting or disposing of refuse. On the other hand, purposive sampling was also used to select the participants for the interview section.

G. Sources of data

The researcher relied on both primary and secondary data for this study. The primary source of data for this research was obtained through observation, questionnaire and face to face interview. The secondary data for this study were taken from newspapers, articles, books, and internet sources. Also the researcher derived some of the survey questions from Puopiel, (2010: 73-93), including similarities and dissimilarities. These were captured in chapter two during the review literature. They were also used to discuss the findings in chapter five. Some of the secondary data obtained include: the concept of solid waste, the process of solid waste management, the activity of Zoomlion Ghana Ltd, policy framework guiding waste management in Ghana, etc.

H. Instrumentation

Three main instruments were used in the study; observation, questionnaire and interview. The details of how each tool was used in the study have been discussed below.

1. Observation

This was a preliminary field investigation which was done to study and assess the condition of the following:

- Community waste collection skips containers (App. C. i)
- Zoomlion official Litre bin for the door-to-door collection in the Municipality (App. C, ii)

- Dump sites/Landfill site (App. C. iii)
- Streets gutters (App. C. iv)
- informal contracts with Sunyani Municipal Assembly Office and the Zoomlion Ghana Limited.

During the observational, pictures were taken pictures were taken, and these were used to support the analysis of the data gathered from the field as shown in the appendix. Again, this supported the designing of the questionnaire and the interview guide.

2. Questionnaire

The questionnaire was designed to gather quantitative data for the research question one, two and three. Two structured questionnaires were designed for the residential and non-residential areas. The residential questionnaire consisted of 25 question items with two sections for the quantitative data collection (Appendix A1). The first part was designed to collect background information on personal data like age, educational level, current job and income position. The Non-residential questionnaire (Appendix AII) with similar structure also contained 27 question items. The two questionnaires cover the following areas:

- Types of solid waste generated and how they are disposed of in the study area,
- Mode of collection and frequency of disposal of the solid waste
- Practices of collecting and disposing of solid waste
- The availability of the resource for the solid waste collection and disposal and the efficiency of the resources.
- Challenges facing Zoomlion in the solid waste service delivery and the possible solutions.

3. Interview

To gain more insight into the data collected in the first phase, the semi-structured interview was adopted for data collection. The choice of the instrument was supported by Creswell (2014: 304) who posit that fact about people's place of work and to gain insight of an event through interview are the ideal tool. The semi-structured interview guide was used to collect data for qualitative analysis (Appendix B). The interview guide for qualitative data covered issues such as:

- Types of solid waste generated in the study area
- Availability of resources in the municipality
- the mode and frequency of the solid waste collection and disposal
- To examine the challenges that hinder the collection and disposal of solid waste in the Sunyani Municipality.

I. Data collection procedure

Data were collected in the two phases. The first phase which lasted for two weeks was used for the casual observation and administering of the questionnaire. The researcher administered the questionnaire personally to all respondents with the help of trained students. This was done to aid faster completion of the questionnaire. It also gave the researcher opportunity to clarify any misunderstanding of any of the items to the respondents.

The second phase of the data collection which lasted for two weeks was the interview as well as the observation. The primary objective of using interview was to clarify issues. Note taking was used alongside audio tape recording. The recorded tape was played back to the interviewees to verify its correctness. Transcriptions of the recorded audio responses were done for the presentation.

J. Validity

Before the research commenced, the researcher had to make sure each instrument for data collection could effectively collect the data it purported to collect. Hence, the item developed was pilot tested. The findings from the pilot test led to some changes in the questionnaire items. For ex-ample, the wordings of the interview questions were amended to make them more understandable. Also, the number of issues on the questionnaire was reduced from 34 to 19 for the residential and 23 for non-residential areas. The face and content validity of the instrument

K. Data analysis

Data analysis was done using several techniques. In the context of this study, data were analysed both qualitatively and quantitatively. The quantitative data were largely analysed by the use of percentages, means, standard deviations and graphs through Statistical Package for Social Science (SPSS 17.0 version for windows, 2003). However, qualitative data were analysed using word descriptions.

L. Research ethical consideration

Ethical issues related to research were observed. The purpose of the study was explained to the respondents before selecting them. Their confidentiality was assured most importantly their income level. Their responses were classified as anonymous. Permission was asked from the Sunyani Municipal Assembly and Zoomlion Ghana Limited before the study was commenced. This was done with the help of an introductory letter from the school. The participants' confidentiality was assured before the interview. Further, the researcher handled any information collected professionally and used exclusively for the academic purpose for which it was gathered.

M. Summary

This chapter discussed the research design, which includes both qualitative and quantitative methods. The setting, population, sample size and the sampling techniques were also explained. It also captured observation, questionnaire and interview as the primary instrument for the study. The next chapter focuses on the presentation of the results and analysis of the results to obtain a better understanding of data gathered from the field study.

CHAPTER FOUR

PRIVATE SECTOR PRACTICES IN THE COLLECTION AND DISPOSAL OF SOLID WASTE IN GHANA

A. Solid Waste

> Solid waste mostly is refused, garbage, or rubbish that are generated in the homes and other places. It includes old newspapers and car tires, broken furniture and even rotten foods. They may also include any waste that is non-liquid. Solid waste is also left-over substances that are generated form "human and animal activities" (Tchobanoglous et al., 1993; as cited in Puopiel, 2010:8). In a review of Zerbock (2003), as cited in Puopiel, (2010:8), solid waste comprises of "hazardous and non-hazardous, domestic, industrial, and commercial" solid waste generated from "domestic rubbish, street sweeping, institutional and constructional garbage". The concept of solid waste comes with its classifications. Correct classification is the foundation for ensuring effective collection, transportation, storage, disposal and treatment for successful protection of the human health and the environment.

Indeed, solid waste is also any substance, object produced by humans in their "domestic, commercial, and industrial" activities, that are of no significance to its primary user, and are disposed as unwanted (Puopiel, 2010: 9). Having discussed the meaning and forms of solid waste, it is necessary to analyse the types of solid waste and their generated sources.

B. Forms of solid wastes and their sources

Following Tchobanoglous et al. (1993) as cited in Puopiel (2010: 9), the Table 2 below provides the classifications of solid waste according to types of solid waste, ideal location and examples of solid waste generated.

Table 2: Types, location or Source and examples of solid waste generated

Types of solid waste	Typical location	Examples of Solid Waste generated
Industrial solid waste	Buildings, manufacturing, processing and, chemical plants, lumbering, mining, demolition.	Rubbish, ashes, demolition and building waste materials
Commercial/ municipal solid waste	Restaurants, office, markets, printing shops, hospitals, schools, stores, hotels.	Food waste, ashes, rubbish,
Residential solid waste	Single and multifamily dwellings, high rise and lower medium apartments.	special wastes, ashes, rubbish, food wastes
Agricultural solid waste	Vineyards, field and row crops, orchards, farms and feedlots.	Agricultural waste, rotten food waste, animal faeces
Treatment plant sites solid waste	Water, wastes water, and industrial treatment processes.	Treatment plant wastes, principally composed of residual sludge
Open area solid waste	Playing-grounds, parks, alleys, street, recreational centres, highway and beaches.	Rubbish and special waste

Source: Tchobanoglous et al (1993 as cited in Puopiel,2010:9)

C. Regulatory framework of Public-Private Partnership (PPP) on Solid waste collection and disposal in Ghana

Regulations are simply laws and rules that oblige commitment, responsibility, obligations or prohibit specific agreements and contracts. The policy regulations influence and or control the tendency of the private sector's performance, but the cohesion between the formal and the real implementation depend on the institutional capacity and political context at the local level have influences on the per-

formance of the private sector (Oduro- Kwarteng, 2011). In addition, Oduro-Kwarteng (2011: 295-297) believes that the private sector's involvement in solid waste collection and disposal demand for a superior and more tactful role of specific sector regulation. In facts the rationale for the regulation of solid waste collection and disposal is to find solutions to the contracts failures such as "monopoly power, externalities and information asymmetries or deficiencies" (Oduro-Kwarteng, 2011:44).

According to the sanitation (2004: 2)[13], the "National Environment Sanitation Policy Coordinating Council (NESPoCC)", which Carried out the "National Sanitation Policy consists of the Ghana Health Service/Ministry of Health (GHS/MOH), Ghana Education Service (GES), Ministry of Environment and Science (MES), Environmental Protection Agency (EPA), Representatives of Metropolitan, Municipal, and District Assemblies (MMDAs), Council for Scientific and Industrial Research(CSIR), the Private Sector and Non-Governmental Organizations". According to Sanitation (2004: 2)[14], the current "bye-law for the 110 MMDAs have sufficient laws for backing the Environmental Sanitation Service Delivery and enforced the compliance of sanitation rules". Despite these, the MMDAs have failed in providing hygienic and safe healthy environment for the people due to logistical problems. The regulatory policy on solid waste collection and disposal between government and private sector companies looks at the basic principles of environmental sanitation problems and constraints. The role and responsibilities assigned to ministries, communities, departments, agencies and the private sector lie in the environmental management and protection. Legislation and law enforcement are the criteria for specifying services, programmes, funding, equipment and supplies among others as specified in the National Sanitation Policy[15].

D. Solid Waste Collection and Disposal in Ghana

The current Solid waste collection and elimination practices differ considerably from low, middle and high-income countries. However, solid waste collection

[13] http://docplayer.net/21610184-Sanitation-country-profile-ghana.html
[14] http://docplayer.net/21610184-Sanitation-country-profile-ghana.html
[15] http://docplayer.net/21610184-Sanitation-country-profile-ghana.html

and disposal management in the Municipalities can be managed through the control of solid waste generation, storage, collection, transfer and transport, processing and disposal (Tchobanoglous et al., 1993, as cited in Puopiel 2010). Indeed, the effectiveness of Tchobanoglous et al. (1993) principle of managing solid waste should be done in accordance with the principles of public health, economics, engineering, conservation, aesthetics and other environmental consideration in addition to public attitudes (Puopiel, 2010).

In sanitation (2004: 2) "The Ministry of Local Government and Rural Development" supervises the "decentralised Metropolitan, Municipal and District Assemblies (MMDAs)" wastes management system in Ghana. On the other hand, "the regulatory powers are vested in the Environmental Protection Agency (EPA)" under the support of the "Ministry of Environment and Science". The MMDAs are responsible for the solid waste collection and final disposal through the various "Waste Management Departments and their Environmental Health and Sanitation Department".[16]

In Ghana, the traditional management of solid waste service delivery started from 1957, and it has been in existence till date. According to Oduro-Kwarteng, (2011:27-29) the central government was responsible for providing solid waste management services during the colonial and post-colonial era. In 1957, after the independence, the Public Waste Department (PWD) was instituted to offer sanitation services to the rural and urban areas. However, in the late 1970s, the public solid waste management services declined severely in the cities, making it very hard for the government to manage (Awortwi, 2003 as cited in Oduro-Kwarteng, 2011:27). The issues of inadequate funds for the procurement of capital equipment as a result of repeated plants, equipment and vehicles breakdown arouse with the deteriorated economic conditions in the 1980s. the solid waste management services worsened in 1985 with people still disposing indiscriminately (Benneh et al., 1993: 38; AMA/Colan Consult, 1995 as cited in Oduro-Kwarteng, 2011:27).

Normally, the effectiveness and efficiencies of solid waste collection and disposal, is not the sole responsibility of government but equitable distribution of

[16]http://docplayer.net/21610184-Sanitation-country-profile-ghana.html

responsibilities, and authorities between all stakeholders. To do this, successive governments in Ghana took the necessary initiative in the early 1990s to manage solid waste services efficiently (Oduro-Kwarteng, 2011). This initiative brought about a paradigm shift in the assemblies' policy on solid waste management services. Due to this, the assemblies' responsibility in managing solid waste services was shifted to the private sectors. Not much have been achieved in this recent years despite all these initiatives (Awortwi 2003).

In ensuring effective solid waste collection and disposal, the cities contracted private companies to collect solid waste in the Municipals and Districts (Anomanyo, 2004 as cited in Puopiel, 2010: 23). In Kumasi Municipal about fifteen (15), waste collection companies were contracted. However, only one private company has been contracted to manage the collecting and disposal of solid waste in the Sunyani municipality. Indeed, any private company contracted to manage solid waste do so on franchise and contract basis (Oduro-Kwarteng, 2011).

The most common collection processes in Ghana is the residential gathering and communal collection which also includes "curb", "set out-setback" and "backyard carry" (Kreith, 1994 as cited in Puopiel, 2010: 13). According to the USPS (2000) in most cities the solid waste collected from the houses, and "commercial set-ups" are deposited into vessels sited at the various "strategic points and conveyed by trucks/tractors" (Puopiel 2010: 13). In some areas, "concrete bins and containers" are fixed at different sanitation sites and later "lifted for disposal". Also in certain areas, the "Individual litre bins and containers sited near shops are later emptied into the tippers and trucks" (Puopiel 2010: 13).

According to Oduro-Kwarteng (2011:269), about 63 percent of most of the cities in Ghana practice public solid waste dumping or communal sloid waste collection and 21 percent practice resident agents' services. For communal practice system, solid waste collected are dumped into communal storage skip containers and or the ground at officially designated sanitation sites, where the solid waste is collected by ground evacuation using payload equipment and tipper trucks. Even apart from the selected dumping site, solid waste is dumped in some unofficial sites scattered in the city and other places including gutters, drains, streams and lagoons (Oduro-Kwarteng, 2011). According to the research of Oduro-Kwarteng, the proportions of the solid waste collection at public dumping site is partly col-

lected with an average ranged between 60% to 83% across the cities in the country. Indeed, because the cities cannot manage the ever-increasing quantity of solid waste produced in the urban centres, about 30% of the solid waste produced in the cities are handled through informal means. This includes "burying, burning and indiscriminate" dumping particularly in the drainage channels and waterbodies, which finally enters into the drinking waters. The solid waste collected by agents both private and public through house to house method, as at the year 2000 was low (8.4%), while those practicing the full or partial public communal dumping and collection were 67% (Ghana Statistical Service, 2002 as cited in Oduro-Kwarteng, 2011: 13).

Recently, Amoah and Kosoe (2014: 114-115) added that the practice of solid waste collection had not changed completely. Based on the facts that the Solid waste gathered and kept in provisional refuse containers cannot stop the spread of diseases and bad odours, before being burnt, buried or taken to the public sanitation sites. They posit that the commonest features of all the households' solid waste containers are mostly paper cartons, metal basket, plastic containers and bags. Some people also keep their solid waste in dug pits closer to their houses. However, those houses that patronised Zoomlion Ghana Limited solid waste services are given free 12 to 240 litres litre bins after registration. It worth to note that the primary stakeholders accountable for cleaning the streets and gutters, and the collection of solid waste in the cities are the Environmental Department of the assemblies and the private companies employed.

In Puopiel (2010:24), he outlined the "two main" methods of collecting solid waste in Ghana: the "door-to-door or house-to-house collection". This method is common in the high-class residential areas. Households that have registered for this method pay a daily, weekly or monthly fees before their solid waste are collected. The second method which is "communal collection" is common among those leaving in the "low-class areas". The "communal collection" does not attracts any fees. In 2014, Yoada, Chirawurah, and Adongo conducted a direct observation research in Ghana at Kodiabe's from five divisions, they limited their findings to how solid waste materials were disposed. They indicated that, typically, local government is in charge for the disposal of the solid wastes produced by their authority, as well as the maintenance of operational equipment (Yoada, Chirawurah, and Adongo, 2014:2-3).

According to Puopiel (2010: 26), the disposals of solid waste from dustbins or skip containers are planned in agreement with the frequency of the containers becoming full. He posits that the current disposal plan in Nirmal Nagara was classified into the daily collection, and once or twice in a week collection. However, Anomaly stated that in Accra Chorkor, the containers are filled to the brim in the early hours of the morning and those who comes late are not allowed by the sanitation assistant (Puopiel, 2010). Therefore, when the sanitation assistant is not present, garbage is deliberately left on the ground to accumulates. Recently in Kumasi, Otchere, Anan & Bio (2015) also observed that solid waste practices such as handling of solid waste, waste collection, sorting, processing transformation, waste disposal and energy generation are far from being appropriate.

E. Challenges of solid waste collection and disposal in the cities of Ghana

Solid Waste collection and disposal has become the current problem on governments' memo especially in the developing countries of which Ghana is no exception. Governments, partners and Non-Governmental Organisations continually give significant amount of funds and technical support in the form of grant and services in tackling Solid waste management problems.

In spite of the private sector's participation in solid waste collection and disposal in the past years, the issue of poor solid waste management services still exists (Oduro-Kwarteng, 2011:2). In spite of numerous interventions set up to solve the solid waste management problems in Ghana, it appears that all the results of all the policy interventions have turned out to be oblivion. The level at which heaps of solid wastes littered the major streets of the cities in Ghana is alarming and devastating which is not good for the image of a developing economy such as Ghana. One might be tempted to say that, Metro, Municipals and Districts (MMDAs) are not working enough to deal with the problem. The lack of development priority in regards to has caused most governments to waste a lot of funds.

According to Puopiel, the key affecting factors of ineffective solid waste collection are "lack of routine collection of solid waste, poor methods of solid waste management, inadequate skip containers for storing solid waste, and insufficient

resources for the solid waste companies" (Puopiel, 2010:66). Awortwi (2003) also added finance is the main reasons for the private sector's failure in solid waste services in Ghana, even though he posits that lack of coordination between departments have the link on solid waste management, and is also seen as another problem.

In a review of Zurbrugg (1999); Onibokun and Kumuyi (1999); Oduro-Kwarteng et al., (2006), as cited in Oduro-Kwarteng (2011:2) factors such as "irregular solid waste services, inadequate service coverage, solid waste spill over from litre bins and skip containers, and the lackadaisical behaviour of people towards improper disposing on unapproved sites and improper solid waste littering" are the main problems in solid waste management.

Oduro-Kwarteng (2011:31) also noted that the fast rate of unstructured and unplanned urbanisation in Ghana poses great challenges to solid waste collection and disposal in most cities in the country. It is noted that inadequate logistics and the non-deterrent of the law are not enough to make the MMDAs strong in guaranteeing safe, clean and healthy environment[17]. Elsewhere in South Africa, Nkosi (2015: 45) found out that illegal dumping of refuse is the most challenging factor in solid waste collection.

It has also been noted that problem of solid waste management in developing countries lies in its collection. As observed by Pacione in (2009): "Most city governments are confronted by mounting problems regarding the collection and disposal of solid waste. In high-income countries, the problems usually centre on the difficulties and the high cost of disposing of the large volume of waste generated by households and businesses. In lower-income countries, the main problems are related to the collection, with between one-third and one-half of all solid waste generated in Third World cities remaining uncollected" (Pacione, 2009: 611).

As reported by Tsiboe and Marbell, that Environmental Protection Agency suggests that "municipal solid waste has been disposed anywhere, anyhow without regard to the nuisance and harm caused to the environment. All kinds of solid wastes, regardless of their nature, are being dumped indiscriminately into depressions, sand pits, old quarries, beaches, drains and even, in certain areas, along the streets" (Tsiboe & Marbell, 2004). Kendie also believes that the problem of solid

[17] http://docplayer.net/21610184-Sanitation-country-profile-ghana.html

waste collection and disposal practices come from the city authorities who have been encouraging inappropriate behaviours concerning solid waste management payment and programs (Kendie, 1998). On the other hand, Tsiboe and Marbell (2004) noted that some people believe that the problems of solid waste collection and disposal in cities are economical while other believes is cultural, most people also attribute it to migration problems and poor management services.

In fact, the debate on the challenges of solid waste collection and disposal will continue and on since the causes are attributed to different factors. One thing that the stakeholder of solid waste management service should take note of is the consequences of the improper collection and disposal of the waste. There is no doubt that the accumulation of solid waste within the environment is an observable problem which cannot be ignored. Even the solid collection sites and official dumping sites can become an environmental hazard, especially with the irregular group and the habit of mixing household refuse with the faecal material. Also, the place becomes unsightly and unpleasant, making the sites risky for children, exacerbating fly and creating rodent problems. When these solid waste are washed away, they block drains in the streets which end up causing flooding, the spread of diseases and also destroying the aesthetic value of the community[18].

CHAPTER FIVE

PRIVATE SECTOR INVOLVEMENT, PRACTICES OF SOLID WASTE COLLECTION AND DISPOSAL IN THE SUNYANI MUNICIPALITY

A. Introduction

This chapter presents data, analysis and discussion of the private sector's involvement and practices of solid waste collection and disposal s in the Sunyani

[18] https://www.modernghana.com/news/544185/1/ghanas-solid-waste-management-problems-the-contrib.html

Municipality. The chapter has been presented in themes such as demographic characteristics of the respondents, private sector involvement in solid waste collection and disposal, forms of solid waste generated, mode of collection, and availability of resources for the solid waste collection and disposal, practices of solid waste and challenges that hinder the collection and disposal of solid waste in the Sunyani municipality.

B. Demographic characteristics of Respondents

The demographic data of respondents was collected on the variables of gender, age, educational background, occupation and the income levels of the respondents. This ensured that all major characteristics of the population were obtained for this study. In total, 70 respondents participated in the survey out of which 40 were selected from non-residential areas and the remaining 30 from the residential areas in the same Municipality. The sample size consisted of 28.6 % which represented 20 males and 71.4% which represented 50 females. The result indicated that majority of the respondents who participated in the study were female while the male respondents were in the minority. The majority of the participants were within the age group of 31-40 years with 38.6% representing 27 respondents, followed by the age group of 21 -30 years with 31.4 % which represent 22 respondents. (9) Respondents within 51-60 years were the third age group in the study with 12.9%. 10% representing 7 respondents were also within age group of 41 – 50 years while the remaining (1) respondent which is 1.4 % was in the age group of 11 – 20 years.

The educational background of the respondents in this study ranged from non-formal education to formal education. It was revealed that majority, 35.7 % (25) of the respondents were middle school/ JHS leavers, 20.0% which is (14) of the respondents had tertiary education. 17.1% representing 12 of the respondents have completed SHS/Tech/Vocation educational levels. The results also showed that 12.9 representing (9) of the respondents have completed Teacher or Nursing Training education. 7.1% representing (5) of the respondents said they were primary school leavers while 7.1% representing (5) of the respondents were without formal education.

The work statuses of the respondents were categorised into 'employed', self-employed and unemployed. The result shows that majority, 57.1% (40) of the re-

spondents were either employed by private or government while 22.9 % (16) of the respondents were self-employed. However, 20.0% (14) were unemployed. Concerning their income level, 22.9 % (16) of the respondents were within the range of 900 -1200 GH¢, 17.1% (12) of the respondent were within the range of 600 – 900 GH¢, 15.7% (11) of the participants were also in the range of 300 – 600 GH¢. 12.9 % (9) of the respondents indicated that they received 1200 GH¢ and above as their monthly income while 11.4% (8) respondents were receiving below 300 GH¢ per month. However, 20.0 % (14) respondent were unemployed and therefore did not receive any monthly income.

C. Private sector involvement in the collection and disposal of solid waste in the Sunyani Municipality

As it has already been revealed, the private sector got involved into the solid waste management as a result of cost reduction or the ineffectiveness on the part of the public sector. In this case, the aim of involving the private company is crucial to its performance in the agreement (Awortwi, 2003). In regards to Sunyani Municipal Assembly, Zoomlion Ghana Limited, was contracted for the collection and disposal of solid waste due to poor performance of the Assembly in managing the solid waste in the Municipality. According to the Sunyani Municipal Environmental Health Analyst (MEHA), "Zoomlion is working under franchise agreement to collect and dispose solid waste". It was indicated that unlike Accra, Takoradi, Tema and Kumasi which had competitive advantage of private companies bidding for the contract, Sunyani Municipality had no such competitive bidding of private companies. In this case the contract was awarded to Zoomlion giving them a monopolistic advantage in solid waste collection and disposal. As it was noted by MEHA, the monitoring and supervisory role were done by the Assembly on a daily basis. However, the private company also had their own manager and supervisors who monitored and supervised the collection and disposal on daily basis.

To promote effectiveness Awortwi (2003) was with the view that the check and balance should be done before, during and post contract. In that regard, the Assembly signed a contract agreement with Zoomlion before the start of the work. According to both Zoomlion officer and the Municipal Environmental

health analyst, the two parties met and negotiated on how the collection and disposal should be done and the duration of the contract. In addition to the signing of the agreement, Zoomlion was required to submit their monthly, quarterly and annual reports to the Assembly. On daily basis, Assembly officers were to round to check if the company was performing according to the agreement. It was indicated that the Assembly was capable of supporting Zoomlion in the collection and disposal of solid waste in the Municipality.

> "the assembly owns all the fieldworkers' and equipment Zoomlion is using for its operations, even though they are in the custody of the Zoomlion, the assembly becomes the final custodian if the entire contract is terminated. We give some of the Assembly's common fund to them to aid their services. The funds are deducted from the ministry of finance. This is just to say that they are managing everything for us." (MEHA).

In fact, from the MEHA statement it is still not clear whether the Assembly is practicing franchising or concession. However, the MEHA has indicated that the agreement is franchising even though they have entrusted the private sector to be in charge of solid waste services, the Assembly claim ownership over their equipment and resources during and after the contract period which turns out to be a concession instead of concession. Awortwi was with the view that involving all stakeholders in the solid waste services promote high performance and effectiveness. Concerning the stakeholders' involvement in the private sector solid waste services, the Municipal Environmental Health Analyst indicated that:

> "at the moment the Stakeholders of solid waste collection and disposal in the Municipality are the elected Assembly members of each electoral area, they monitor the activities of the private company in their electoral areas and give feedback to the us. The chiefs (Nananom) who gave us the land for the final disposal. Currently, the disposal site is closer to Sunyani Polytechnic so they are also one of our key stakeholders and the last stakeholder is the community members".

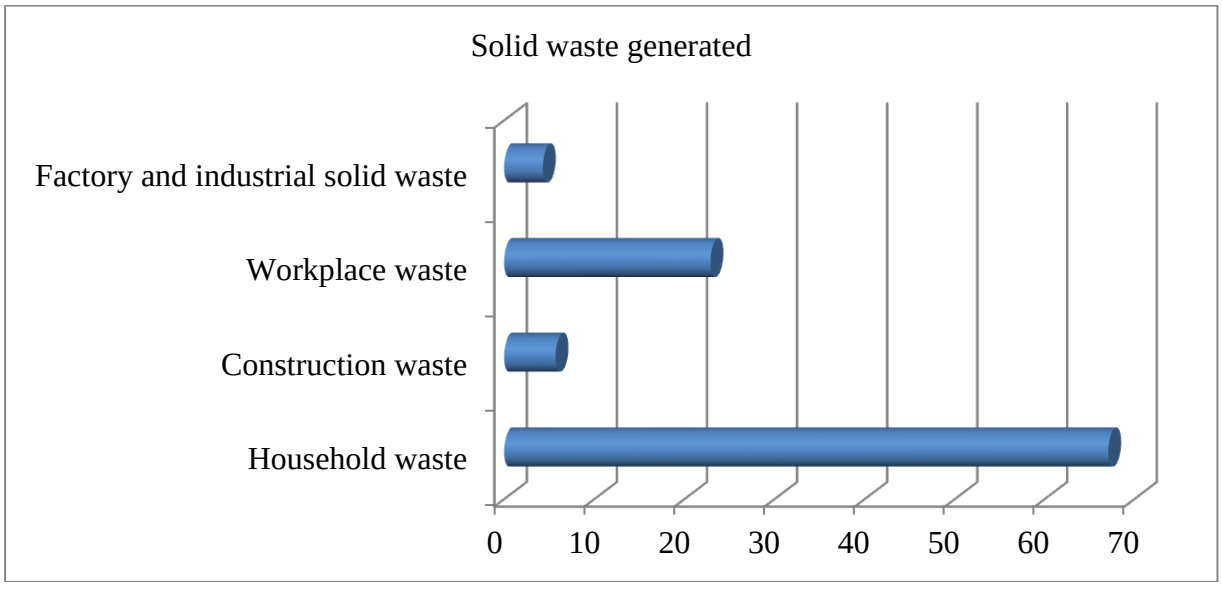
Involvement of the private sector in solid waste collection and disposal entails a lot. However, Awortwi (2003) was with the view that irrespective of the private sector's involvement, the basic fundamental rights should be observed. Zoomlion, operating as the only private waste company in the Sunyani Municipality makes it clear that there was no competitive bidding for the contract. From my

personal observation, it is important to note that both the Municipal Assembly and Zoomlion are responsible for the collection and disposal of solid waste but do not actively involve all the stakeholders in the solid waste services.

D. The forms of solid waste generated and the mode that they are kept/store before Collection in the Sunyani Municipality

One of the research objectives sought to identify the types of solid waste generated and the mode in which they are kept. To ascertain this data both questionnaire and interview were used. With regard to the survey, respondents were asked to tick all the solid waste they generate upon which a tally was done to determine the frequencies.

Figure 1: shows the result of the solid waste generated in the Municipality.



Source: fields survey 2016

Figure 1: Solid waste generated in the Municipality

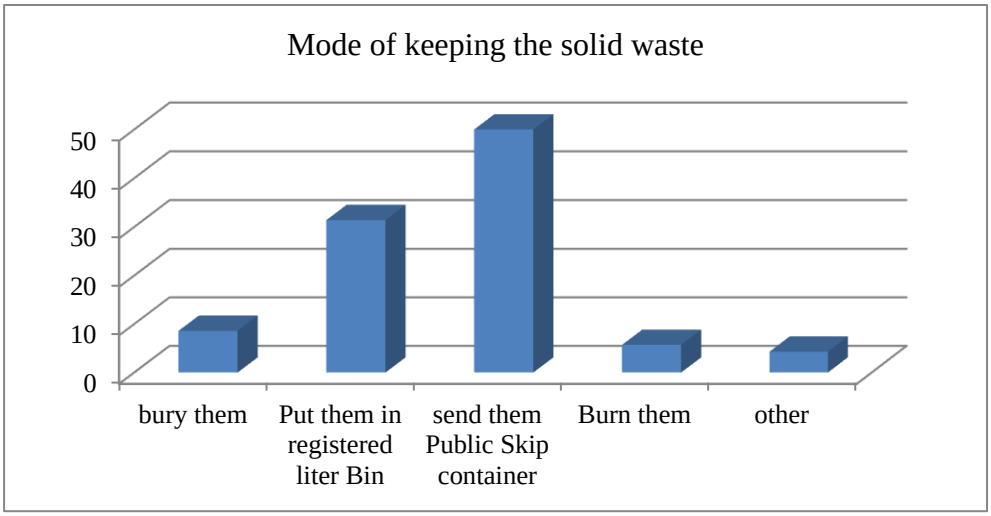
During an interview with the Zoomlion Officer, who is the Head of Environmental and Sanitation (HES) and the Municipal Environmental Health Analyst (MEHA), it was revealed that the solid waste generated in the Municipality are not segregated though the Municipality produced different kinds of solid waste. For instance, this was how the Zoomlion Officer's remarks was captured:

"The forms of solid waste generated in the Municipality are domestic, hazardous, paper bags, degradable and non-degradable solid waste. In fact, the solid waste generated in the Municipality are not segregated. We only collect them and send them to the disposal landfill site. So to be honest with you, we do not have the resources and recycling site for the segregation" (HES).

In conclusion, the finding revealed that Sunyani Municipality generates 67.1% of household solid waste followed by 22.9% workplace solid waste, 5.7 % constructional solid waste and 4.3% industrial solid waste. The findings from the interview agrees with the survey findings that the Municipality generates different forms of solid waste such as domestic solid waste, workplace solid waste, organic and inorganic solid waste, degradable and non-degradable solid waste.

This current finding confirmed the previous findings of Zerbock (2003) and The Ghana Innovation Marketplace (2009) on solid waste classifications. On the other hand, the finding could not identify agricultural solid waste which therefore makes it in partially agreement with Tchobanoglous et al (1993) classification of solid waste. But since this current study could not identify agricultural solid waste and treatment plant solid waste in its findings, however, does not dispute the earlier findings of Tchobanoglous et al, perhaps, due to the fact that this study was only limited to the regional capital.

Figure 2: how the solid waste is kept before disposal



Source: fields survey 2016.

Having identified the types of solid waste generated in the Municipality, respondents were asked to indicate how they are kept or stored before they are sent to collection centres. It was revealed from **(figure**: 2) that half of the respondents 50.0% (35) participants kept their solid waste in the communal skip containers daily, 34.3 % (24) of the respondents kept their solid waste in zoomlion's registered litre bin. The result also indicated that 2.9% (2) of the respondents bury their solid waste while 5.7% (4) of the respondents burn their solid waste. Also, 4.3% (3) participants specified that they throw their solid waste into the bush. The respondents were asked to indicate their reason of choice.

Two of the respondents who bury their solid waste noted that *"there was an unused pit near us"*. Those who put their solid waste into the zoomlion's registered litre bin gave these reasons: "*it is convenient*", "I am alone and have *no one to send it to the collection site", "the communal skip container is far from us"*. However, majority of the respondents who used to communal skip container also gave these reasons: *"we don't have the money to pay for Zoomlion's door to door services", "the communal skip container is closer to us", the communal skip container is what we have been using for many years."* A few who burnt their solid waste are in the workshops and constructional sites, they indicated that "*the materials are easy to burn***". (See figure 3**) Those who threw them into the bush noted this: *"we stay close to the bush and the container is not close to us"*.

Figure 3: resident burning their solid waste

Source: fields survey 2016.

All the interviewees indicated that there were different ways through which residents kept their solid waste before collection is made. It was revealed that some people immediately after sweeping sent their solid waste to the communal container or approved dumping site. Some people kept their waste in the litre bins while some burned or threw them in the bush. For instance, the Municipal Environmental Health Analyst gave this explanation:

"Oh, there are different ways of keeping the solid waste; some keep them in the polythene bags, rubber containers and sacks. Some people have also registered for Zoomlion litre bins for their solid waste storage while others gather their solid waste into their individual containers and send them to the communal skip container daily after sweeping" (MEHA)

In assenting, my observation captured different ways of keeping solid waste from figure 2. It was also revealed that It was also revealed that the various mode of keeping the generated solid wastes are: keeping them in plastic or rubber containers, registered litre bins, communal skip containers, polythene bags and sacks (Puopiel, 2010; Oduro-Kwarteng 2011; Amoah & Kosoe, 2014).

Figure 4: Show the different ways of keeping solid waste.

Source: Field observation, 2016.

a. Refuse stored in rubber container

b. Refuse stored in registered litre bin

c. Refuse stored in sacks bags for disposal

E. The mode and frequency in the collection and disposal of solid waste in the Sunyani Municipality

The research objective three sought to determine the mode and frequency of the solid waste collection and disposal. It was revealed that communal collection and door-to-door collection were the two main collection mode practices in the Sunyani Municipality. The findings indicated that majority of people in the Municipality used the communal mode than the door-to-door collection mode as con-

firmed in Oduro-Kwarteng (2011). It was also revealed that the solid waste is kept through informal means such as burying, burning and indiscriminate disposal (dumped elsewhere), particularly in water bodies and drainage channels and formal means such as communal skip container and various litre bins (Puopiel, 2010; Oduro-Kwarteng 2011; Amoah & Kosoe, 2014). Also Oduro-Kwarteng (2011) earlier on identified that some people in the cities still throw their solid waste in drainage channels and waterways which eventually find their way into the sea.

Table 3: Mode and payment of the solid waste collection

s/n	Item	Yes	No
11	Is there any charge(s) for the collection of the solid waste?		
	Communal collection*	0 % (0)	100 % (40)
	Door-to-door collection**	76.7% (23)	23.3 % (7)

*Source: fields survey 2016 (N= 70, * Non-residential Areas, ** Residential areas)*

The respondents in each area were asked to indicate if they were charged for their services. From Table 3, 100% (40) of the respondents who stayed in the non-residential areas said they were not charged for dumping into the communal skip containers. However, 76.7% (23) of the respondent in the residential indicated that they were charged for their door-to-door mode of collection while 23.3 % (7) of the respondents in the residential areas were not charged because they also used the communal skip container.

The researcher had the opportunity to observe how long the skip containers got full and the alacrity with which the Zoomlion emptied those containers whenever they got full. The result is presented in Table 4.

Table 4: Number of days the skip containers become full and the days they are emptied to the final disposal site.

Area	Type	Number	Number of Days	Observational	re-

		of Days the container gets full	the container is emptied to the final disposal site	marks
Penkwase New Site	NR	4 days	3 days	excess solid waste spilt on the ground
Penkwase old Town	NR	1 day	2 days	Excess solid waste spilt on the ground
SNNIT	R	6 days	1 days	No solid waste found on the ground
Airport Area	R	8 days	2 days	No solid waste on the ground
Zongo Town	NR	2 days	1 days	Excess solid waste spilt on the ground
Zongo Market	NR	1 days	3 days	Excess solid waste spilt on the ground
New Dormaa A	NR	2 days	2 days	More excess spilt on the ground
New Dormaa B	NR	2 days	1 days	No excess found

Field Observation, 2016; NR- Non-Residential Area, R-Residential Area

Concerning the rate at which the containers get full, Puopiel (2010) opined that the containers take different days to get full. Indeed, this current study found similar findings in the Municipality. The study also found out that in most cases, when the container is full, it took Zoomlion some days before emptying the containers. From the table above, it was observed that the skip containers in the populated areas like Zongo Market, and Penkwasi Old Town got full in a day whilst those in the New sites and residential areas took 2 to 8 days for the containers to become full. However, it took them 2 to 3 days before they were emptied by Zoomlion Ghana Ltd. The findings of this current study confirmed the findings of Puopiel (2010) that disposals of solid waste from dust bins or skip containers are planned in accordance with the frequency of the container getting full. For instance, one of the Assembly Members confirmed with this statement: "*The frequency of going for the full container to the final disposal site depends on the area".*

Figure 5: Residents throwing garbage on the ground when the container was full

Source: Field observation, 2016.

Figure 6: spilt solid waste due to the delay of collection.

Source: Field observation, 2016.

The attitude of residents throwing garbage on the ground whenever the container is full (Puopiel, 2010) was also observed in this current study (see figure 5

and 6). In addition, the Head of Environment and Sanitation (HES), at Zoomlion Ghana Ltd also noted this:

> "We work every day but the collection and disposal days for those areas are not fixed it various depending on the day the container get full. Some are emptied daily while in some places it twice or thrice in a week".

The evidence from these findings suggest that in the Sunyani Municipality the collection and disposal of solid waste are done according to the rate at which the containers get full (Puopiel, 2010). This finding is contrary to the Environmental Guidelines for Small-Scale Activities in Africa (EGSSAA) 2009 which provide that tropical solid waste should be done daily in both dry and wet seasons (Knausenberger, W.I., et al 1996).

F. Practices on the collection and disposal of solid waste in the Sunyani Municipality

Table 5. shows the descriptive statistics on the practices of solid wast collection and disposal in the Sunyani Municipality.

Table 5. Descriptive results of solid waste collection and disposal practices in the Sunyani Municipality.

					Confidence level @ 95%	
s/n	Items	N	M	Std. D	Lower	Upper
1	Waste are properly sorted by the generators at source	70	1.26	.440	1.15	1.36
2	Waste are properly stored in containers before collection	70	2.41	1.450	2.07	2.76
3	Collected solid waste are transferred to central transfer points first	70	2.51	1.380	2.19	2.84
4	The collector (Zoomlion) has sufficient facilities	70	2.31	1.001	2.08	2.55
5	Solid waste is properly sorted at each stage of the management system	70	1.34	.478	1.23	1.46
6	Are solid waste process to recover product	70	1.83	.868	1.62	2.04

7	Solid waste is transported to long distance for disposal	70	2.01	1.083	1.76	2.27
8	Final disposal is done by landfill	70	**4.01**	.876	3.81	4.22
9	Final disposal by composting	70	1.86	.643	1.70	2.01
10	Final disposal by thermal / incineration	70	**3.57**	1.246	3.27	3.87
11	Final disposal by Recycling	70	1.29	.455	1.18	1.39
12	Solid Waste are transformed through thermal, shredding and chemical means	70	2.49	1.338	2.17	2.80
	Average statistic	**70**	**2.24**	**0.94**	**2.02**	**2.46**

Source: fields survey 2016

From Table 5, 12 variables captured 6 elements on the practices of collection and disposal of solid waste. These include sorting, storing, transfer and transportation, disposal, recovery and facilities. From the findings, only one construct had an average score above that mean score 3. The total average mean score of 2.24 and standard deviation 0.94 at 2.02 lower and 2.46 upper confidence level of 95% were obtained for the 12 variable constructs. Indeed, the overall mean score of 2.24 is below the average score of 3. Significantly, the implication is that majority of the respondents believe that the collection and disposal practices of solid waste in the Sunyani Municipality is poorly done.

Even though, the methods of managing solid waste vary greatly according to the types of solid waste and the local conditions, solid waste management practice should be accomplished in an orderly and efficient manner that would promote good health for residences (Tchobanglous et al, 1993). On the basis of this, collection and disposal practices incorporate the following; source of solid waste, separation, storage, collection, transfer and transportation, disposal and recovery (Tchobanoglous et al, 1993).

Generally, one would expect that the key elements in the collection and disposal management system should be strategized in accordance with efficiency, health, environmental requirements, physical demands and zoning parameters.

This study found out that within the five key elements of solid waste management, the most important activities such as sorting of solid waste, storing of generated waste, transfer of solid waste, final disposal of solid waste and recovery of solid waste in the Sunyani Municipality are either poorly perform or not even

practiced (Tchobanoglous et al, 1993). This finding confirmed earlier finding of Otchere, Anan & Bio (2015) that solid waste practices such as handling of solid waste, waste collection, sorting, processing transformation, waste disposal and energy generation are far from being appropriate.

F. Availability of resources for the collection and disposal of solid waste in the Sunyani Municipality

Availability of resources were investigated to determine the competencies and the strength of both Municipal Assembly and the Zoomlion Ghana Limited in the collection and disposal of solid waste in the Municipality. The result is presented in Table 6.

Table 6: Availability of resources for the collection and disposal of solid waste

s/n	Item	Yes	No
9	Do you have public solid waste skips containers or approved sanitation site or litre bin for solid waste collection?	84.3 % (59)	15.7 % (11)
14	Is there a sanitation assistance to assist at the collection point?	22.9 % (16)	77.1 % (54)
15	Do you have ladder that aid you in throwing of your solid waste into the skip container?	34,3% (24)	65.7 % (46)
16	Is the community having street /road sweepers?	60 % (42)	40 % (28)
17	Are there enough trucks for the disposal of collected solid waste?	20 % (14)	80% (56)

Source: fields survey 2016

The frequency that workers sweep the street or road and emptying the gutters were determined. From this finding, 31% of the respondents said that they see the road sweepers 'daily', 10% of the respondents said it is done 'Once in a week', 28.6% of the respondents said it is done 'twice in a week', 10% respondents also said 'thrice in a week' while 20% of the respondents noted 'not at all'.

Two opinions were derived from the interviews: some residents and private sanitation workers believed the resources are not enough, the officers in-charge thought otherwise. Some interviewees noted that some of the resources in the Municipality were enough (litre bins, skip containers and uniforms) while some equipment such as trucks, door-to-door waste collector, tricycles bulldozers were

not enough. On the other hand, both the Municipal Environmental Health Analyst and the Zoomlion Officer opined that the resources were adequate for the collection and disposal of the solid waste. This is how it was captured:

Zoomlion Officer said.

> "Well for now we have enough resources. We are working with 307 road sweepers. We have 4 skip loaders, 3 compaction trucks, 2 bulldozers, 1 roll on or roll off truck, sufficient litre bins for the whole Municipality but only 2500 are in used, 43 skip containers are in operation with more than 10 excesses due to of lack of approved site …." (HES).

In addition, MEHA Said:

> "the Zoomlion have abundant litre bins which every household but only 2500 household have registered for. We have more skip containers, only 49 are on the sanitation sites. We have sufficient skip containers but there is no sanitation site. Some of the sanitation sites are having 2 skip containers. There are few trucks, 4 skip loaders, one for the Assembly and the remaining 3 for the Zoomlion, 4 compaction trucks: 1 for the Assembly and the 3 for Zoomlion. We have other materials such as wheelbarrows, Rakes, shovels which are being used for the National Sanitation clean up exercises. As for the human resources it is the capacity of the Zoomlion to employ them. We are currently managing with the little resources available" (MEHA).

Even though there are two opinions on the availability of resources for the collection and disposal, the findings from the survey and interview suggest clearly that both human and materials resources are not adequate in the Municipality. As perceived by Oduro-Kwarteng (2011), the efficiency and effectiveness of private sector performance is measured based on the productivity, service quality and profitability (cost recovery). However, the current study looks at the service quality which is fundamental to the private sector's performance in the collection and disposal of sloid waste. Therefore, the operational definition is determined in relation to the input quantity and the output quantity in the collection and disposal of solid waste in the Sunyani Municipality. It is also important to take into account the assertion of Post, Broekema and Obirih-Opareh (2003) that service effectiveness can be assessed in terms of reliability and frequency of collection. Therefore, this study set out to determine the availability of resources for the collection and

disposal in the Sunyani Municipality. The result of this current study shows that majority of the residents representing 84.3% have access to communal skip container or litre bins for the collection of their solid waste while 15.7 % of the residents do not have access to the communal skip container or litre bin. However, there were extra skip containers and litre bins at the offices of Zoomlion only that those areas have no sanitation sites.

The second major finding was that, only a few communal collection centres have sanitation assistant, only a few skip containers had ladder to aid in the disposing of solid waste into the container. The finding of this study suggests that the frequency of cleaning the street and gutters was done in relation to the intensity of solid waste generated in the area. In general, it was revealed that litre bins, skip containers wheelbarrows, tricycles, shovels, uniforms were available even with excess. However, trucks, grader, workers and site for the disposal were inadequate (Puopiel, 2010).

In line with the effectiveness of Zoomlion in the collection and disposal of solid waste, Awortwi (2004) had earlier posited that private sector's involvement in solid waste services does not yield any benefits in terms of "efficient argument" on Public-Private Partnership in Ghana. Again, a common view amongst the interviewees was that of effectiveness of Zoomlion in collection and disposal of solid waste in the Municipality need more effort.

G. Challenges that hinder the collection and disposal of solid waste in the Sunyani Municipality.

From the study it was revealed that 37.1% of the respondents believed that there are no challenges in the activities of Zoomlion in the collection and disposal of solid waste in the Municipality. However, a significant number of respondents 62.9% perceived that the Zoomlion is faced with some challenges in discharging their services in the Sunyani Municipality. These challenges are: 'inadequate trucks and vehicles', 'frequent break-down of truck loaders and tricycles', 'lack of dumping sites', 'inadequate workers' and 'poor attitudinal behaviour of the residents'

The finding from the interviews also revealed the following challenges as: behavioural attitude, lack of knowledge, inadequate tools and trucks and inadequate workers. Other challenges were lack of landfill site, poor road network, and unpreventable weather conditions.

The workers of Zoomlion (road sweepers, waste collectors and truck drivers) also affirmed these challenges. Some of the road sweeper attributed it to the bad attitude of the people toward sanitation and lack of sanitation materials. The truck drivers attributed it to the bad road network when it rains and irregular maintenance of the vehicles and trucks.

From the interview it became clear that challenges facing the Zoomlion Company in the collection and disposing of solid waste occur in three ways; human challenges, material challenges and unpreventable weather conditions. The human challenges aspect are insufficient workers, people's attitude towards sanitation practices and sanitation workers and lack of knowledge or education, the material challenges include lack of tools and trucks, poor road networks and lack of landfill site while the unpreventable weather conditions relate to difficulty in working during rainy season.

The current finding that behavioural attitude, lack of knowledge is consistent with Oduro-Kwarteng et al., (2006). The finding has also concurred with Onibokun and Kumuyi (1999) and Oduro-Kwarteng et al. (2006) that inadequate tools and trucks and inadequate workers are some of the challenges the private sector faces in solid waste collection. Other challenges like lack of landfill and sanitation site, poor road network, and inadequate resources were noted earlier on by Puopiel (2010). The study also identified inadequate funds as one of the challenges (Awortwi, 2003). One unanticipated finding was that the company drivers find it difficult when driving during the rainy seasons (unpreventable weather conditions) since the landfill is a waterlogged area. The challenges emerged from the study made me agreed with Obiri-Opareh (2002) and Awortwi as cited in Phoelsingh (2006) that the private sector is still faced with the challenging issues of inefficiency and low service quality due to factor in the enabling environment. These challenges may explain the Zoomlion's current service quality in the Sunyani Municipality.

Upon the challenges stated, the respondent suggested the following: more private waste companies should be involved in the solid waste service as it is done

in the cities of Accra, Kumasi and Tema, the municipal and the Zoomlion should give intensive education on sanitation to the public. It was also suggested that the government should partner solid waste management experts across the globe to train workers on the effective ways of collecting and disposing solid waste.

CHAPTER SIX

SUMMARY, CONCLUSION AND RECOMMENDATIONS

A. Introduction

This chapter presents a summary of the entire study, conclusion that was drawn from the research objectives, recommendations and suggestion for further research.

B. Summary of the findings

The aim of the study is to look at the private sector involvement and their practices in the collection and disposal of solid waste in Ghana: a case of Zoomlion in the Sunyani Municipality in the Brong Ahafo of Ghana. The study em-

ployed both qualitative and quantitative approach as a mixed method in the collection of the data. The study was guided by the following research questions: private sector's involvement in solid waste services, the forms of solid waste generated and the mode of keeping/storing the solid waste in the Municipality, mode of collection and the frequency of the solid waste collection and disposal, availability of resources for the collection and disposal in the Municipality and challenges that hinder the collection and disposal of the solid waste in the Sunyani Municipality. In regards to the objectives the study revealed that:

In private sector's involvement in the solid waste collection and disposal, there are different ways in which the private sectors involve themselves into the solid waste management in Ghana. These are through contracting out, open competition, franchising and concession or leasing. This study revealed that Zoomlion as a private sector company was contracted through concession agreement. It was also found out that the Zoomlion's contract was awarded without any competitive procurement bidding. However, monitoring, and supervisory role are done by both the Municipal Assembly and the Zoomlion Company through monthly, quarterly and annual reports. On the other hand, it was revealed that Municipal Assembly does not actively engage the entire stakeholder in the solid waste collection and disposal system.

Forms of solid waste generated and how they are kept before collection.

Identification of the forms of solid waste generated in a specific location is the fundamental element in the development of strong management strategies for the collection and disposal. The findings identified domestic solid waste, workplaces or commercial solid waste, construction solid waste and industrial solid waste as some of the major solid wastes generated in the Sunyani Municipality. It was also revealed that these types of solid waste are not segregated. The study found out that majority of residents keep their solid waste in the communal skip containers, some keep them in the litre bins provided by themselves or by Zoomlion, whereas other residents burn, bury or throw them in the bush.

Mode of collection and frequency of the disposal of the solid waste in the Municipality

The study identified communal collection and door-to-door mode of collection as the two main ways of solid waste collection in the Sunyani Municipality. The findings indicated that in some area containers take 1-2 days or 3-4 days while others take 5-7 days or more to get full, the solid waste collection and disposal in the Sunyani Municipality is done according to the rate at which the containers get full. Therefore, there are no regularity for the collection of the solid waste, however, the solid waste in some areas are collected daily, others twice or thrice in a week.

Solid waste collection and disposal practices

Again, it was revealed that some crucial activities such as sorting of solid waste, storing of generated solid waste, transfer of solid waste and final disposal of solid waste and recovery of solid waste in the Sunyani Municipality are either poorly perform or not even practiced. From both the observation and survey it clearly revealed that the collection and disposal practices in Sunyani Municipality is far from being appropriate

The availability of the resources for the collection and disposal in the Sunyani Municipality

The findings revealed that the resources were not available for the collection and disposal of solid waste in the Municipality. However, Zoomlion and the Municipal Assembly still have excess skip containers, shovels, and litre bins. Some important resources such as hand skip loaders, trucks, graders, tricycles and workers were not adequate for the solid waste services. Again, it was also noted that the municipality is not having sufficient sanitation sites for the skip containers.

The challenges facing Zoomlion in the collection and disposal of solid waste in the Sunyani Municipality.

The findings revealed the following challenges: insufficient workers, people's bad attitude towards sanitation practices and the sanitation workers and lack of knowledge or education. Other challenges include lack of tools, trucks, poor road networks and lack of landfill sites.

B. Conclusion

The difficulty of solid waste collection and disposal has been a menace in some cities especially in the developing countries of which Ghana is not excluded. There is news of heaps of solid waste left uncollected around cities' streets, gutters waterways and residences. This uncollected solid waste in the end result in flooding, spreading of diseases, and the destruction of the aesthetic value of the community. The inability of the public to make effective service delivery in the collection and disposal of solid waste has led to the pattern shift of solid waste services from the public sector to the private sector from. It is against this background that the study aimed at assessing the private sector involvement and the practices in the solid waste collection and disposal of the Zoomlion Ghana Limited in the Sunyani Municipality of Ghana.

This study has established important findings that have implication for solid waste collection and disposal system. First, the purpose of private sector in the collection and disposal of solid waste was as result of ineffective service delivery from the Municipal Assembly. Unlike Accra, Takoradi, Tema and Kumasi which have competitive bidding for solid waste contract, Sunyani Municipal has only one private company, which is Zoomlion Ghana Ltd thereby giving them the monopolistic advantage in the solid waste collection and disposal services.

Second, the Municipality generates different forms of solid waste; domestic solid waste, workplace solid waste and industrial solid waste, however, there are no proper segregation of the solid waste in each of the collection and disposal centres. Thirdly, from the two main collection services, the communal collection is practised by the low income residents and door-to-door collection by the middle and high income residents. Fourth, some resources such as skip containers, uniforms and litre bins are available and even in excess, while skip loaders, roll on or off trucks, grader and other heavy duty vehicles for the collection and disposal are inadequate and as a result affect the service delivery of Zoomlion Ghana ltd in the municipality. It was also noted that inadequate personnel, lack of materials and equipment, and human behaviour hinder the activities of solid waste collection and disposal.

From the study, some important activities such sorting of solid waste, storing of generated waste, transfer of solid waste, final disposal of solid waste and recovery of solid waste were the five key elements of solid waste management. It can be concluded that the collection and disposal of solid waste practices in the munici-

pality are poor. However, their poor performance could be attributed to the monopolistic advantage of the company in the Municipality since there are no other companies to compete with. In a similar vein, the poor performance could also be ascribed to some of the challenges mentioned earlier. Yet, it is believed that they can perform better when all modalities such as sufficient resources, enforcement of laws and proper education for attitudinal change are put in place with the collaboration of all stakeholders.

C. Recommendations

Based on the findings, the following recommendations have been made:

Sunyani Municipality should adopt competitive tendering which is a critical factor in lowering costs and improving efficiency.

Sunyani Municipal Assembly should make provisions for solid waste segregation so that the 3Rs of solid waste collection and disposal strategies could be achieved.

Community awareness and education on solid waste collection and disposal system should be given regularly within the Municipality by the Municipal Assembly to change the bad attitudinal behaviour of the citizens towards sanitation

The Sunyani Municipal Assembly should intensify monitoring, supervision and evaluation of the activities of Zoomlion especially, in terms of the frequencies of solid waste collection and disposal.

The Assembly should also comply with the contract agreement so that they can also enforce the sanctions as prescribed in the contract when the private sector is performing below expectation.

There should be consistency in the solid waste collection and disposal by the Zoomlion Ghana Limited, especially in the denser populated communities to evade over flow of the containers. This will keep the community clean and also prevent any outbreak of diseases such as cholera and typhoid.

There should be by-laws to regulate the storing and keeping of solid waste in the Municipality to avoid indiscriminate disposal.

D. Suggestion for further studies

The current study has assessed the performance of private sector and the challenges they face in the collection and disposal of solid waste in Ghana with particular reference to Zoomlion Ghana Limited in the Sunyani Municipality. In the process of the assessment, there were a number of issues that critically needed to be looked at in the collection and disposal of solid waste in the country. These include the strategies of collecting and disposing the solid waste, lack of technology in the collection and disposal solid waste, and the challenges private sector face in service delivery such as inadequate trucks and personnel for the field activities. These issues prompted the researcher to suggest that research should be carried out on how solid waste contracts are given to private sectors in Ghana. Again, an investigation should be done on the integration of technological solid waste collection and disposal system in Ghana.

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APPENDIX

APPENDIX A1

Solid Waste Management in Ghana: The Case of Sunyani Municipal Assembly

Household Questionnaire: Residential Area

The research is mainly for academic purpose. Therefore, answers given will be strictly treated as confidential. Thank you.

Instruction: Please tick *ONLY THE BOX* of the response given/explain briefly questions without possible answers.

SECTION A: BACKGROUND INFORMATION

1. Gender [ ] Male [ ] Female
2. How old are you? [11-20 [ ] 21- 30 [ ] 31- 40 [ ] 41- 50 [ ] 51 – 60 [ ] 61+
3. What is your highest level of education?

   [ ] None [ ] Primary [ ] Middle/J.S.S/J.H.S [ ] Secondary/Technical/ vocational [ ] Training College [ ] Tertiary
4. What is your major Occupation?

   [ ] Employed [ ] self-employed [ ] Unemployed
5. Approximately, how much do you earn in a month?

   [ ] Below 300GH¢ [ ] 300 – 600 GH¢ [ ] 600- 900 GH¢ [ ] 900 - 1200 GH¢

   [ ] 1200 and above

SECTION B: ASSESSMENT OF SOLID WASTE COLLECTION

6. Which of the following Solid waste do you generate in your home? **(You can tick more than one answer).**
   [ ] Food wastes [ ] Paper and Cardboard, Textiles [ ] Plastic and Rubber [ ] Metals and Glass

7. How do you dispose off the solid waste generated?

   [ ] Bury them [ ] Put them in the Zoomlion registered liter Bin [ ] Public Skip container
   [ ] Burn them [ ] put them in the nearby gutters [ ] other, specify: ……

8. What are your reasons for choosing the above means of refuse disposal?
   ……
   ……
   ……
   ……
9. Is there any charge(s) for the collection of the solid waste?
   [ ] Yes [ ] No
10. If yes, how often do you pay? [ ] daily [ ] weekly [ ] monthly
11. How many days does the litre bin get full?
    [ ] 1-2 days [ ] 3-4 days [ ] 5-7 days [ ] more 1 week
12. How many times is the solid waste dispose off from the liter bin**?**
    [ ] daily [ ] Weekly [ ] Monthly
13. How do they maintain high sanitation around the liter bin?
    ……
    ……..
    ……
    ……
14. Is the community having street /road sweepers?
    [ ] yes [ ] no
15. How often do they sweep the street/road and empty the gutters?

    [ ] daily [ ] Once in a week [ ] Twice in a week [ ] Thrice in a week [ ] not at all
16. How do you rate their services?
    [ ] Poor [ ] satisfactory [ ] Good [ ] Excellent
17. Do you perceive to be a challenge in the collection and disposal of solid waste in the Municipali-
    ty?.....
18. What possible challenges facing Zoomlion in the collection and disposal of solid waste in the Municipali-
    ty?……
    ……..……
    ……..
    ……
    ……
19. What possible solution do you suggest?

……
……..
……
……..

20. Rate the following item using strongly Agree, Agree, neutral, Disagree and Strongly Disagree with a tick (√)

s/n	Item	strongly Agree	Agree	Neu-tral	disagree	Strongly disagree
1	Waste are properly sorted by the generators at source					
2	Waste are properly stored in containers before collection					
3	Collected solid waste are transferred to central transfer points first					
4	the collector (Zoomlion) has sufficient facilities					
5	Solid waste is properly sorted at each stage of the management system					
6	Are solid waste process to recover product					
7	Solid waste is transported to long distance for disposal					
8	Final disposal is done by landfill					
9	final disposal by composting					
10	Final disposal by thermal / incineration					
11	final disposal by Recycling					
12	Solid Waste are transformed through thermal, shredding and chemical means					

APPENDIX AII

Solid Waste Management in Ghana: The Case of Sunyani Municipal Assembly
Household Questionnaire: Non Residential Area

The research is mainly for academic purpose. Therefore, answers given will be strictly treated as confidential. Thank you.

Instruction: Please tick *ONLY THE BOX* of the response given/explain briefly questions without possible answers.
SECTION A: BACKGROUND INFORMATION

1. Gender [ ] Male [ ] Female

2. How old are you? [ ] 11-20 [ ] 21- 30 [ ] 31- 40 [ ] 41- 50 [ ] 51 – 60 [ ] 61+

3. What is your highest level of education?

   [ ] None [ ] Primary [ ] Middle/J.S.S/J.H.S [ ] Secondary/Technical/ vocational [ ] Training College [ ] Tertiary

4. What is your major Occupation?

   [ ] Employed [ ] self-employed [ ] Unemployed

5. Approximately, how much do you earn in a month?

[ ] Below 300GH¢ [ ] 300 – 600 GH¢ [ ] 600- 900 GH¢ [ ] 900 - 1200 GH¢

[ ] 1200 and above

6. Which of the following Solid waste do you generate in your home? **(You can tick more than one answer).**

[ ] Food wastes [ ] Paper and Cardboard, Textiles [ ] Plastic and Rubber [ ] Metals and Glass

7. How do you Keep your the solid waste generated for collection?

   [ ] Bury them [ ] Put them in registered liter Bin [ ] Public Skip container
   [ ] Burn them [ ] put them in the nearby gutters [ ] other, specify:

8. What are your reasons for choosing the above means of refuse disposal?

……
……
……
……

9. Do you have public solid waste skips containers or approved sanitation site for solid waste collection? [ ] Yes [ ] No
10. If yes, approximately, how many minutes does it take you to get to the public skip container?
    [ ] 1-10mins. [ ] 11- 20mins. [ ] 21-30mins [ ] 31-40mins. [ ] More than 40mins
11. Is there any charge(s) for the dumping of the solid waste?
    [ ] Yes [ ] No
12. How many days does the skip container become full?
    [ ] 1-2 days [ ] 3-4 days [ ] 5-7 days [ ] more 1 week
13. How many times in a week do the Zoomlion workers come for the Skip containers when it is full**?**

[ ] daily [ ] Twice in a week [ ] Thrice in a week [ ] every week

14. Is there a sanitation assistance to assist at the collection point?
    [ ] yes [ ] no
15. Do you have ladder that aid you in throwing of your solid waste into the skip container?
    [ ] yes [ ] no
16. What is the mode of transferring the solid waste in the skip container to the landfill?
    ……
    ……..
17. Are there enough trucks for the collection and disposal of solid waste in the Municipality?
    [ ] yes [ ] no
18. How do they maintain high sanitation around the skip container?
    ……

……..
……
……

19. Is the community having street /road sweepers?
    [ ] yes [ ] no
20. How often do they sweep the street/road and empty the gutters?

[ ]daily [ ] Once in aweek[ ] Twice in a week [ ] Thrice in a week [ ] not at all

21. How do you rate the services of solid waste management company in your area?
    [ ]Poor [ ] satisfactory [ ] Good [ ] Excellent

22. Do you perceive that Zoomlion has challenges in the collection and disposal off solid waste in the Municipali-
    ty?.....
23. What possible challenges facing Zoomlion in the collection and disposal of solid waste in the Municipali-
    ty?……
    ……..……
    ……..

……
……

s/n	Item	strongly Agree	Agree	Neu-tral	disagree	Strongly disagree
1	Solid Waste is properly sorted by the generators at source					
2	Solid Waste is properly stored in containers before collection					
3	Collected solid waste are transferred to central transfer points first					
4	the collector (Zoomlion) has sufficient facilities					
5	Solid waste is properly sorted at each stage of the management system					
6	Are solid waste process to recover product					
7	Solid waste is transported to long distance for disposal					
8	Final disposal is done by landfill					
9	final disposal by composting					
10	Final disposal by thermal / incineration					
11	final disposal by Recycling					
12	Solid Waste are transformed through thermal, shredding and chemical means					

24. What possible solution do you suggest?

……
……..
……
……..

25. Rate the following item using strongly Agree, Agree, neutral, Disagree and Strongly Disagree with a tick (√)

APPENDIX B

Interview guide

A. Interview guide for both Waste Management company and Municipal Assembly

1. What type of solid waste generated in the Sunyani Municipality? (List them)
2. How does the solid waste generated kept before collection in the Municipality?
3. How does the waste generated dispose off in the Municipality?
4. How frequent is the solid waste collected and disposed off? (In a week)

5. What resources are available and how efficient in collecting and disposing the waste generated? *(in terms of human and Materials)*
6. Are there challenges you face in your service delivery and how do you overcome it?
7. What is the type of the contract between Zoomlion and the Assembly
8. Is there any policy framework between management organization and the government?
9. Is there any policy framework regarding sanctions if one party is defaulted and do you apply it?
10. What is your role in the contract?
11. How would describe the following resources in the organization;

Names of resources	**Number that are Accessible**	**Number that are needed**
motorist tricycle		
Skips containers		
Graders		
Liter bins		
Oboafo tricycle		
Skip Loaders		
Workers that sweep the streets		
Bulldozers		
Roll on/Roll off trucks		
Compaction trucks		
Others:		

Authors compilations from Puopiel, 2010: 87

B. Interview guide for Solid Waste Collection Company

1. What type of solid waste generated in the Sunyani Municipality? (List them)
2. How does the solid waste generated kept before collection in the Municipality?
3. How does the waste generated dispose off in the Municipality?
4. How frequent is the solid waste collected and disposed off? (In a week)
5. What resources are available and how efficient in collecting and disposing the waste generated? *(in terms of human and Materials)*
6. Are there challenges you face in your service delivery and how do you overcome it?
7. What is the type of the contract between Zoomlion and the Assembly?

8. Is there any policy framework between management organization and the government?
9. Is there any policy framework regarding sanctions if one party is defaulted and do you apply it?

B. Interview guide for Assemblyman (3)

1. What type of solid waste generated in your area? (List them)
2. How does the solid waste kept by the residents before the collection in your area?
3. How does the waste generated dispose off in your area?
4. How frequent is the solid waste collected and disposed off? (In a week)
5. Are the resources available for your area?
6. Are the workers efficient in collecting and disposing the waste generated?
7. Are you aware of any policy framework between management organization and the Municipal Assembly? If Yes
8. How effective is Zoomlion in the collection of the solid waste?

Interview guide for Company Workers

1. What type of solid waste generated in the Sunyani Municipality? (List them)
2. How do solid wastes generated being kept before collection in the Municipality?
3. How does the waste generated dispose off in the Municipality?
4. How frequent is the solid waste collected and disposed off? (In a week)
5. What resources are available and how efficient in collecting and disposing the waste generated? *(in terms of human and Materials)*
6. Are there challenges you face in your service delivery and how do you overcome it?

APPENDIX C

Skip container u
waste in the Mu

Z
–

iii. Chocked gutters

iv. Final land-fill

v. Skip container used in collecting solid waste in the Municipality