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Quality Service Delivery by Solid Waste Management Companies in Regional Capitals and Cities in Ghana

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Abstract
Solid waste management has been insurmountable with its challenges in urban and regional capitals in Ghana. The private waste management companies combined with district assemblies has provided some relieved solution. The objective for the study is measuring quality service delivery by solid waste management companies in regional capitals and cities in Ghana. A descriptive cross sectional survey design mixed method using structured interviews and questionnaires for data collection from May 2018 to April 2019. The study engaged 1,620 residential households that demands services from solid waste management companies throughout the country representing 89.5% valid data collected using purposive sampling, use of SPSS and excel for the analysis. Socio-economic factors; head of households, age, educational level, income, number of people per households, gender, location of region, and cities determine the household satisfaction perception. The findings indicate that distribution of solid waste companies varies from regions with most service providers in the capital. From the survey, 90.6% sampled population uses door-to-door service provider for waste disposal lifted by compassion trucks or tricycles. 58.6% had signed service level agreement (SLA) with their service provider. 88.8% were satisfied with the work from Service Company and collection of their solid waste. They would not want to change the service provider. The satisfaction factors were regular and timely lifting of refuse 70.9%, moderate fee charges 24.6% and prompt feedback 4.5% respectively in order. 67.0% opted satisfied with their waste lifted once weekly. 89.4% were willing to pay for their waste generated with an average household paying GHc 50 as a monthly charge, through a revenue collector. The study recommends district assemblies to monitor and evaluate performance of all solid waste service providers. The district assemblies in collaboration with the central government plus international donors should help establish waste recycles plants. This will solve waste management challenges and creates more jobs for the youth of Ghana

Keywords: *Quality Service Delivery, Solid Waste Management, Project Financing*

1.0 INTRODUCTION

Solid waste creation is inevitable in human daily household activities. Man will continue to create waste and these needs to be manage and dispose of properly (Letcher, T. M., & Vallero, D. A. 2019; Porter, M. E., & Kramer, M. R. 2019). Waste from the residential apartments includes solid and liquid waste (Rogoff, M. J., & Screve, F. 2019; Ugwu, E. I., Ekeleme, A. C., Awoyera, P. O., Ozioko, H. O., & Osinachi, U. 2018). All these waste needs special care treatments (Adam, M. N. 2018; Sulemana, A., Donkor, E. A., Forkuo, E. K., & Oduro-Kwarteng, S. 2018; Yescombe, E. R. 2018). Liquids waste includes; sewerage and other effluents from bathrooms and kitchens. Solids waste includes; organic and inorganic materials (Henze, M. 1997; Prüss-Üstün, A., & Townend, W. K. 1999; Pires, A., Martinho, G., Rodrigues, S., & Gomes, M. I. 2019). The wastes cannot be stored at individual's houses or homes hence the need to dispose them off regularly (Chen, P., Xie, Q., Addy, M., Zhou, W., Liu, Y., Wang, Y., & Ruan, R. 2016; Rogoff, M. J., & Screve, F. 2019).

1.1 Background of Study

Residential areas need to dispose of their solids waste properly to protect the environment and avoid outbreak of communicable diseases in their communities (Prüss-Üstün, A., & Neira, M. 2016; Simos, J., Naissem, F. B., Naissem, J., Sokona, F. M., de Dieu Konongo, J., Sani, A., & Haroun, A. 2017; Kaza, S., Yao, L., Bhada-Tata, P., & Van Woerden, F. 2018). Managing solid waste by private investors, through public private partnership has improved significantly in Ghana over a decade ago (Mohan G., Yadav A.K. 2019; Saadeh, D., Al-Khatib, I. A., & Kontogianni, S. 2019; Siagian, E. S., Sumaryana, A., Widianingsih, I., & Nurasa, H. 2019; Spoann, V., Fujiwara, T., Seng, B., Lay, C., & Yim, M. 2019). The waste management service provider's collects or picks human generated solid waste from residential houses or apartments and takes them to waste landfills sites (Christensen, T. (Ed.). 2011; Oteng-Ababio, M., Arguello, J. E. M., & Gabbay, O. 2013; Araujo, M. 2018). This was the responsibilities of district assemblies until the engagement with private sector partners. Under this privatization projects, the polluter pays for the waste produce instead of the district or government financing refuse collection (Boateng, K. S., Agyei-Baffour, P., Boateng, D., Rockson, G. N. K., Mensah, K. A., & Edusei, A. K. 2019; Oduro-Appiah, K., Afful, A., Kotey, V., & de Vries, N. 2019; Saadeh, D., Al-Khatib, I. A., & Kontogianni, S. 2019). The private waste management companies are appointed by district assemblies to lifts solid refuse from residents (Fobil, J. N., Armah, N. A., Hogarh, J. N., & Carboo, D. 2008; Obirih-Opareh, N., & Post, J. 2002; Amoah, S. T., & Kosoe, E. A. 2014; Lohri, C. R., Camenzind, E. J., & Zurbrügg, C. 2014). They are to provide residents with dustbins, which is not free. Residents are to pay for the collection of waste (Mariwah, S. 2012; Akaateba, M. A., & Yakubu, I. 2013; Akhtar, S., Ahmad, A. S., Qureshi, M. I., & Shahraz, S. 2017; Hurd, J., Hennink, M., Robb, K., Null, C., Peprah, D., Wellington, N., & Moe, C. L. 2017; Mahamah, R. A. 2019).

There has been an improvement in waste management handling through public private partnership arrangement for outsourcing waste management. The improvement has been the participation of private waste management services, collection of solid waste from households (Suleman, D., Simon, M., & Agyapong, R. 2015; Sibanda, L. K., Obange, N., & Awuor, F. O. 2017). The service providers engage the residential dwellers and pick up the refuse generated from houses (Adam, M. N. 2018; Sulemana, A., Donkor, E. A., Forkuo, E. K., & Oduro-Kwarteng, S. 2018; Yescombe, E. R. 2018). With significant improvement in managing waste collection in Ghana, there is still filth due to loitering as persons migrate to cities and regional capitals in search for non-existing jobs and generate waste indiscriminately. This waste continues to heap in some parts of residential apartments especially uncompleted buildings and some ceremonial streets in Ghana (Achankeng, E. 2003: Puopiel, F. 2010; Oteng-Ababio, M., Arguello, J. E. M., & Gabbay, O. 2013; Kien, A. H. 2018; Salvaire, C. 2019; Tompkins, R. 2019).

1.2. Statement of the Problem

Managing solid waste has become insurmountable with it challenges in most urban cities and regional capitals in Ghana, and this required improved service quality delivery. Private waste management services provide the requiring urgent solution (White, R., Turpie, J., & Letley, G. L. 2017; Cobbinah, P. B., & Adams, E. A. 2018; Francis Xavier, M. K., Millar, D., & Tanguo, J. 2018). The rapid urbanization from other regions to the capital has increase indiscriminate loitering because of rising slums (Nnaji, C. C. 2015; Fiave, R. E. 2017; Doron, A. 2018). The local urban and district municipal or metropolitan's authorities cannot tackle this situation, hence the need to improve waste collection through public private partnership using delivery from waste management companies (Adam, M. N. 2018; Francis Xavier, M. K., Millar, D., & Tanguo, J. 2018; Sulemana, A., Donkor, E. A., Forkuo, E. K., & Oduro-Kwarteng, S. 2018; Yescombe, E. R. 2018).

1.3 Primary Research Objectives

The primary objective of this research is to measure quality of service delivery by solid waste management companies in the regional capitals and cities in Ghana.

1.4 Secondary Research Objective

The secondary objectives of the study are to:

- Measure quality service in refuse collection in residential apartments in regional capitals and cities.
- Assess the willingness to pay for the services provided by the waste management companies.

1.5 Limitations of the Study

The research is a study of quality service delivery by solid waste management companies in the regional capitals and cities in Ghana. The fieldwork, the findings and the conclusions from the research will be valid for the regional capitals, cities in Ghana, and selected service Providers Company only. The researcher used the mixed methods research of qualitative and quantitative for the study, which influences the research work in the interpretations

from the findings (Padgett, D. K. 2016; Bryman, A. 2017; Creswell, J. W., & Clark, V. L. P. 2017; Bell, E., Bryman, A., & Harley, B. 2018; Flick, U. 2018). An interview guide was used which may increase the possibility of an interviewer bias in the interviews (Creswell, J. W., & Creswell, J. D.2017; Bell, E., Bryman, A., & Harley, B. 2018; Flick, U. 2018). Seeking of information from identified stakeholders for this research was very optimistic, as these stakeholders were willing to participate in the research and provide the needed answers.

1.6 Design and Overview of the Study

This is a descriptive research survey methodology where the respondents and the researcher cannot change the results from the field (Sekaran, U., & Bougie, R. 2016; Yin, R. K. 2017; Nardi, P. M. 2018; Kumar, Ranjit 2019). The survey intends finding facts enquires on quality service delivery by waste management service providers. The researcher has no control over the variables or decisions expressed from the residents in the selected regional capitals and cities (Padgett, D. K. 2016; Bryman, A. 2017; Creswell, J. W., & Clark, V. L. P. 2017; Bell, E., Bryman, A., & Harley, B. 2018; Flick, U. 2018). The researcher seeks to measure the quality of service delivery. It will also measure the perception of quality of service from residential stakeholders, and the causes from failure to meet the expectations from the refuse collectors (Sekaran, U., & Bougie, R. 2016; Yin, R. K. 2017; Nardi, P. M. 2018; Kumar, Ranjit 2019). In such cases, the researcher cannot control the variables. The researcher can only report what is happening (Yin, R. K. 2017; Nardi, P. M. 2018; Blaikie, N., & Priest, J. 2019).

The preferences from the respondents on what is service quality will be the paramount. It describes the state of affairs, as it exists between the service providers and their customers (Nardi, P. M. 2018; Kumar, Ranjit 2019). The use of structured questions administered to all houses or residential apartments selected for this research. The focus is to reach the residents in the selected areas for this research work (Creswell, J. W., & Creswell, J. D.2017; Bell, E., Bryman, A., & Harley, B. 2018; Flick, U. 2018). The sampling design for the research work is the simple random sampling method (Dawson, C. 2019; Fink, A. 2019; Iacus, S. M., King, G., & Porro, G. 2019; Morris, T. P., White, I. R., & Crowther, M. J. 2019). Each household or residential apartment within the selected regions and is willing to respond will be given the chance. The number of residential houses expected was 1810. This was to give chances to residents in the chosen cities and regional capitals. A participant in the study includes all available respondents ready to spend time and respond to the questions during the survey.

1.6.1 Scope of the Study

The scope of this study is limited to the study of quality service delivery in solid waste management companies in the regional capitals and cities in Ghana.

1.6.2 Research Questions

The research questions that will drive this study are:

1. Measuring quality service delivery expectations from the waste management companies.
2. Assess the willingness to pay for the services provided by the waste management companies.

1.6.3 Hypothesis

Testing of hypothesis is to tell whether measurement from the data collected is valid (Gelman, A., Stern, H. S., Carlin, J. B., Dunson, D. B., Vehtari, A., & Rubin, D. B. 2013; Mertler, C. A., & Reinhart, R. V. 2016; Blaikie, N., & Priest, J. 2019). The null hypothesis (Ho) is that there is no significant difference between perceptions from household client's expectation on quality service delivery provided by waste management companies (Nardi, P. M. 2018; Little, R. J., & Rubin, D. B. 2019; Kumar, Ranjit 2019). The test compared from their services provided, measured from the respondents in the selected residential areas for this research work. The hypothesis was test at 5% level of significance. The significance expected on quality service from the waste management companies providing services to the residential apartments.

1.6.4 Data for the Study

The data collection techniques employed in the research is the administration of structured interview and questionnaires (Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. 2015: Bryman, A. 2016; Bell, E., Bryman, A., & Harley, B. 2018; Kumar, Ranjit 2019). Quantitative and qualitative measurement instrument was use in data collection (McCusker, K., & Gunaydin, S. 2015; McNabb, D. E. 2015; Bryman, A. 2016; Edmonds, W. A., & Kennedy, T. D. 2016; Bernard, H. R. 2017; Creswell, J. W., & Creswell, J. D. 2017). SPSS was use for analysis. SERVQUAL developed to measure the service providers' quality (Ikediashi, D. I., Ogunlana, S. O., & Odesola, I. A. 2015; Yeo, G. T., Thai, V. V., & Roh, S. Y. 2015; Thai, V. V. 2016; Creswell, J. W., & Clark, V. L. P. 2017; Bell, E., Bryman, A., & Harley, B. 2018). The researcher visited all identified residential

apartments in the regional capitals with the introductory letters and conducted the research using the structured interview and questionnaires.

The questions were dived into three parts. Section 1 (one), covered the background of respondents - their ages, sexes, marital status, and the number of people in household. Such demographic factors will be necessary since they can influence responses (Creswell, J. W., & Clark, V. L. P. 2017; Bell, E., Bryman, A., & Harley, B. 2018). The next two sections cover how do you measure quality of service from the service providers as perceive by the residence in the households, and aassessing the willingness to pay for the services provided by these waste management companies. The data collections from primary and secondary sources allow the researcher to achieve the stated objectives of the research. Primary data are those collected for the first time and these are original in character. Secondary data are those already collected and processed information by other researchers. This includes publications, educational and agricultural statistics, course books, journals, newspapers, reports, articles and other research works related to this study (Sekaran, U., & Bougie, R. 2016; Yin, R. K. 2017; Nardi, P. M. 2018; Blaikie, N., & Priest, J. 2019; Kumar, Ranjit 2019). These sources are very useful in the literature review, which serves as the theoretical and empirical bases for the analysis of the data collected (McCusker, K., & Gunaydin, S. 2015; McNabb, D. E. 2015; Bryman, A. 2016; Edmonds, W. A., & Kennedy, T. D. 2016; Bernard, H. R. 2017; Creswell, J. W., & Creswell, J. D. 2017).

1.6.5 Organisation of Study

The chapter one presents the background introduction to the study of quality service delivery by solid waste management companies in the regional capitals and cities in Ghana. It presents the problem statement, the primary, secondary objectives of the study as well as the limitations of the study. It presents the design and overview of the study, the scope of the study. It states the research questions, the hypothesis, and organisation of the study as well as the summary of the chapter.

The chapter two presents a review of literature that relates to quality service delivery in solid waste management companies in the regional capitals and cities in Ghana. It describes literature and responses from workshops, similar research works and secondary data. All cited authors are reference. The chapter three discus the methodology, research design, and procedures used to gather data for the study. The chapter four presents the results from the field, an analysis and a discussion of the findings of the study. The chapter five summarizes the study, the findings and conclusions from the study, recommendations based on the study, and the limitations from the findings.

1.7 Summary

This chapter is the background introduction on quality service delivery by solid waste management companies in Ghana. It presents an overview of the problem statement, the primary, secondary objectives of the study as well as the limitations of the study. It presents the design and overview of the study, the scope of the study; it states the research questions, the hypothesis, and organisation of the study as well as the summary of the chapter.

2.0 LITERATURE REVIEW

Ghana's municipalities and metropolitan continue to face significant challenges with solid waste management (Amegah, A. K., & Agyei-Mensah, S. 2017; Boateng, K. S., Agyei-Baffour, P., Boateng, D., Rockson, G. N. K., Mensah, K. A., & Edusei, A. K. 2019). Metropolitans and municipal solid waste management collection is a serious concern as well as waste transportations and disposal. The challenge is not limited to Ghana alone but many developing countries especially in Africa (Nkansah, E., Dafor, N. K., & Essel-Gaisey, F. (2015). There is a need for a new way to think about the issue of waste – not just from a management point of view but also from the perspective of waste generators and recycling (Rakodi, C. 2016; Oduro-Kwarteng, S., & Dijk, M. P. V. 2017). The private sector involvement in waste collection over a decade has improved sanitation but much work is needed on recycling and separation. There are approaches to how waste can be collected and reuse (Moh, Y. 2017). These depend on the waste collection methods and way of disposing refuse from households (Daum, K., Stoler, J., & Grant, R. (2017). There are benefits to waste generation and associated challenges. Benefits to waste collection are nowhere near sufficient to address the scale of challenges (Mmereki, D., Li, B., Baldwin, A., & Hong, L. 2016; Owusu-Sekyere, E., Amoah, S. T., & Wedam, E. A. 2017).

Under-utilized and un-managed waste materials pose serious risk to the environment and human health, with the greatest negative impact felt by the most vulnerable in society (Francis Xavier, M. K., Millar, D., & Tanguo, J. 2018). Waste materials can be use in replacement for wood materials, preserving our natural resources and slowing climate change. The activity of assisting waste on its journey to a valuable resource can create millions jobs across society, especially for marginalized citizens (Adam, M. N. 2018; Francis Xavier, M. K., Millar, D., & Tanguo, J. 2018).

2.1 Development of the Study

Managing metropolitans and municipal solid waste continues to burden many districts in Ghana. It has environmental impacts and health burden in many cities in the country. This is not limited to Ghana alone but many Africa countries as well. Overcoming these challenges has been helpful through the municipal authorities engaging the private sectors in waste collection (Adam, M. N. 2018; Yescombe, E. R. 2018). The outsource waste management service providers engage the waste generators or households in collection of waste at an agreed fees payable daily or weekly, and monthly. This depends on the waste service provider or the type of equipment used for the collection. This is a win-win service and has to be agreeing by the district assemblies, the waste polluter or producer and the service provider. The waste service companies need to be innovative and proactive in handling the waste management service. Investing in solid waste management has it peculiar challenges as it poses a threat to project viability (Sulemana, A., Donkor, E. A., Forkuo, E. K., & Oduro-Kwarteng, S. 2018).

2.2 Different Theories

Wastes are unwanted substances that are of no use. Garbage mainly considered includes; wastes from houses - domestic waste, waste from schools, offices, municipal wastes, waste from industries and factories –industrial waste (Bahrami, A., Soltani, N., Pech-Canul, M. I., & Gutiérrez, C. A. 2016). Waste or human created wastes are any unwanted substance, discarded after its primary use. The nature of the item or waste could be worthless, defective or of no value to the disposer. These wastes are normally materials, substances bye product, eliminated naturally or discarded after no longer useful or of no value after its complete life cycle (Lagerkvist, A., & Dahlén, L. 2019).
Alabama department of environmental management defines "waste as any means of garbage, refuse, sludge, from water supply treatment plant, air pollution control facility and other discarded material. This include solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, agricultural operations and from community activities, including any material to be discarded by a generator'' (Bahrami, A., Soltani, N., Pech-Canul, M. I., & Gutiérrez, C. A. 2016; Waste, F. H. 2018).

2.2.1 Sources of Solid Wastes

There are four sources of solid wastes, classified into Industrial, Commercial, Domestic, and Agricultural waste. **Industrial Waste:** These are waste created from the factories and industries. These wastes are dump or dislodge through rivers and seas and cause pollution. Examples include; plastic, glass, spilt oils and refinery wastes. **Commercial Waste:** Commercial wastes are produce from schools, colleges, shopping malls, and Offices. Examples include; plastics pack bags, papers, paper cartons, wooden pallets, HDPE materials, and others. **Domestic Waste:** These are waste from residential or household waste, collected during household activities from cooking, cleaning, weeding, laundry, painting and others. **Agricultural Waste**: These are generated waste from agricultural sectors and fields. These includes waste from farms, animals rearing – cattle's, goats, pigs, cows, chickens and others.

2.2.2 Types of Solid Waste

There are two major types of waste, namely Biodegradables and Non-biodegradable.

Biodegradable Waste: Biodegradables are mainly wastes produced from kitchens and it includes food remains, garden waste, droppings from poultry, domestics' animals and human feacal matter. These are mainly moist waste or waste with high humidity. The waste can be turn into compost for manure and fertilizers. They are by nature able to decompose by themselves over a period depending on the organic materials (Komakech, A. J., Sundberg, C., Jönsson, H., & Vinnerås, B. 2015; Van, D. P., Fujiwara, T., Tho, B. L., Toan, P. P. S., & Minh, G. H. 2019).

Non- Biodegradable Waste: These wastes are by their nature harder or waste comprising hard substances and include broken glasses, and plastics. Non-biodegradable wastes are not able to decompose naturally and are mostly pollutants (Ghosh, A., Sarkar, J. P., & Das, B. 2019; Mukherjee, T., Rahaman, M., Ghosh, A., & Bose, S. 2019).

2.3 Historical Thinking

2.3.1 Solid Waste Management

Solid waste management refers to the process of collection and treating. It is the handling of waste material from source of generation, collection through recovery process to landfills sites. Solid waste is generated from industrial, residential and the commercial activities in a given area or location. These waste generated have to be handle in a special way. Generated waste from residents or industrial wastes are transported to waste landfills sites or to the dumpsites (Amegah, A. K., & Agyei-Mensah, S. 2017; Boateng, K. S., Agyei-Baffour, P., Boateng, D., Rockson, G. N. K., Mensah, K. A., & Edusei, A. K. 2019).

Waste are categorize based on the content of material or substance component matter. This includes plastics, paper, glass, metal and the organic waste (World Bank 2018). Irrespective of the waste continually produced, they are managing systematically to ensure environmental best practices. Managing solid waste is critical in every country and its cities. Incorporation of health and environmental policies in nations on waste management is very useful. Effective management of waste reduces health related problems and outbreak of diseases (Sulemana, A., Donkor, E. A., Forkuo, E. K., & Oduro-Kwarteng, S. 2018). Solid waste management includes planning, administration and financial engineering of the waste dump or landfills sites. The solutions are complex and interrelated to public health, environmental control agencies, city, town and regional planning, government influence, conservation biology and the re-engineering of the waste landfills (Yescombe, E. R. 2018).

Managing waste differ from refuse collection in residential apartments or households, industries, institutions or companies. It differs from urban and rural areas, the developed and developing countries. Waste generation keep on rising higher daily. In 2016, waste produced in the world cities were 2.01 billion tonnes globally. This amounts to 0.74 kilograms of waste generated per person per day. The rapid growth through urbanization is expected to increase by 70% since 2016 to 3.40 billion tonnes in 2050 (World Bank, September 20, 2018). The objective of solid waste management is to reduce and eliminates the adverse economic effects from untreated waste on human life in the environment. Treated wastes also improve the quality of life of human beings and grey animals in communities (Ghosh, A., Sarkar, J. P., & Das, B. 2019; Mukherjee, T., Rahaman, M., Ghosh, A., & Bose, S. 2019).

2.3.2 Solid Waste Disposal and Treatment

The handling of waste at the point of disposal is very crucial. The activity includes use of bins or containers that makes it easier and helpful for waste collection. This helps in lifting waste from household or residential apartment to disposal site or waste landfills using compassion trucks, dump trucks or tricycles in Ghana (Agbefe, L. E., Lawson, E. T., & Yirenya-Tawiah, D. 2019). Waste disposal from household is the final stage of managing solid waste generated. The disposal processes aim to isolate the generated waste from its producers in their environment. Handling this particular depends on the nature of the waste produce. It also depends on the technology use by the service waste companies' in handling the waste, the financial resources, and skilled people (Asibey, M. O., Amponsah, O., & Yeboah, V. 2019).

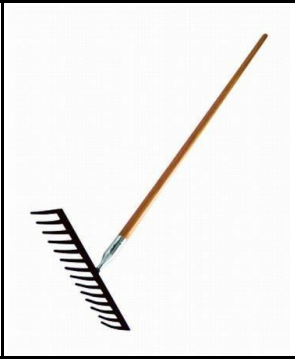
In Ghana and therefore most cities or urban centers, and in the regions the two main waste disposal processes after lifting from source are dumping it at waste landfills. Accra Compost Plant, a new company in Ghana into recycles of waste use a technology to convert organic waste from households into compost for commercial activities farming. The plant is able to separate the waste into organic and inorganic materials. The organic materials are then process into compost and use as fertilizers for farming and horticulture (Annepu, R., & Themelis, N. J. 2013; Andrianisa, H. A., & Brou, Y. O. 2016; Tibu, C., Annang, T. Y., Solomon, N., & Yirenya-Tawiah, D. 2019). Equipment used for waste collection as shown below;

Figure 1: A Compassion lifting Refuse from a residential Apartment.
Source: Field survey, 2019

Other waste equipment includes personal protective, tricycles, and borla taxis as shown in Table 1 below:

LIST OF EQUIPMENT USED IN WASTE MANAGEMENT

Personal Protective Equipment (PPEs) and Trucks

No.	Item Description	Minimum Specification	Picture
1	Wheel Barrow	A wheelbarrow is a metal, wood or plastic transportation device that has one wheel, a bucket (barrow) and two handles. The modern user of the wheelbarrow lifts up the handles and pushes the device forward, using the wheel to lighten the load. A wheelbarrow is use to transport garden soil and waste materials.	
2	Shovel	A shovel is a tool for digging, lifting, and moving bulk materials, such as soil, coal, gravel, snow, sand, or ore. Most shovels are hand tools consisting of a broad blade fixed to a medium-length handle. Shovel blades are usually made of sheet steel or hard plastics and are very strong.	
3	Rake	A rake is a broom for outside use; a horticultural implement consisting of a metal toothed bar fixed transversely to a handle, or tines fixed to a handle, and used to collect leaves, hay, grass, etc	

4	Cutlass	The cutlass is use for pre-planting activities such as the cutting down and clearing of grasses, bushes and trees. It is use to plant the seeds of some crops. In addition, the cutlass is used to harvest some crops and clearing of weeds.	
5	Spade	Is a digging tool. In gardening, a spade is a hand tool used to dig or loosen ground, or to break up lumps in the soil. Together with the fork, it forms one of the chief implements wielded by the hand in agriculture and horticulture. It is sometimes considered a type of shovel.	
6	Safety Boot	A steel-toe boot (also known as a safety boot, steel-capped boot or safety shoe) is a durable boot or shoe that has a protective reinforcement in the toe, which protects the foot from falling objects or compression, usually combined with a mid sole plate to protect against punctures from below.	

7	Pickers	A waste picker is a hand tool used to salvages reusable or recyclable materials thrown away	
8	Foot Fork	Polished stainless steel heads clean and rust resistant. weather-proofed hardwood handle. Note: these tools are not designed to be used on rocky soils. Digging tool. In gardening, a foot fork is a hand tool used to dig or loosen ground, or to break up lumps in the soil.	
9	Red Bristle Street Brush With Stick	It is a brush used for sweeping close to walls or curbs. Has natural Palmyra for rough surfaces.	
10	Reflective Cones	Standard Traffic Cone Uses. Controlling traffic flow during waste collection to avoid accidents into works on the streets. safety cones can also be used to temporarily block areas and establish proper boundaries	

11	Hand Gloves PVC	Made out of PVC material use for handling waste, acid & alkali Chemicals. Gloves comes either supported with inside liningIt gives firm & better grip	
12	Nose Mask	Dust Protection, adjustable Nose Clips. Cup Style White Colour for General Purpose	
13	Safety Helmet	They are made from high-density polyethylene (HDPE) and predominantly used in workplace environments such as industrial or construction sites to protect the head from injury due to falling objects, impact with other objects, debris, rain, and electric shock	
14	Standing Local Broom	Efficiently use for sweeping floors, it is a domestic tool bound together at the end of a long handle, used for sweeping sandy, muddy, concrete and garden surfaces. It is made from Palm trees fronds	

15	Reflective Jackets	The production of reflective fabric uses the principle of retro reflection. Reflective fabric is made of the base cloth, the adhesives, and the micro glass bead. The highly reflective glass beads coated in the surface of the cloth works by reflecting light back to the light source only Reflective material has the function of regressive reflection, that is, it has more visual effects than other non-reflective materials, it can significantly improve its visibility, so that the people in the light source can easily find the target, effectively avoid the accident and ensure the safety of workers	
16	Uniforms	Content/Composition 33 % Polyester, 67 % Cotton, blue, green, red, yellow, cream, brown, etc Uniforms are a great team-building resource for staff, and they can improve overall customer service as well as brand awareness. Employees who wear uniforms with a company's logo and colors allow the business to become instantly recognizable by local customers.	
17	Wellington Boot	Wellington boots are waterproof and are most often made from rubber or polyvinyl chloride (PVC), a halogenated polymer. They are usually worn when walking on wet, water log, or muddy ground, or to protect the wearer from heavy showers and puddles.	
18	Waste Compactor Trucks	Mobile waste Compactor truck, compresses waste materials, minimizing their volume and size, by saving time energy and fuel in the process of moving waste from residential and corporate environments.	

19	Manual Tricycles	The tricycle is a human-powered (or gravity-powered) three-wheeled and are suitable to be used as means of garbage collection from areas not accessible to trucks	
20	Roll-On-Roll-Off Waste Collection Truck	The truck comes with a detachable container design to be transported by the roll-off trucks. They are commonly use to move waste from communal area or loads of construction waste and demolition waste or other waste types.	
21	Tri Dump Trucks	The truck specially designed with three tires, and only 3 tonner, with a capacity of dumping waste collected. They are fuel-efficient and used to collect municipal solid waste and haul the collected waste to a solid waste treatment facility such as a landfill. they are mostly used in areas that are not accessible to bigger trucks	
22	Motorized Spraying Machine	Sprayers Used in liquid and solid waste Applications. Sprayers are commonly use on landfill sites to spray pesticides, weedicides, herbicides, fungicides, and defoliants as a means of infection control. There are many kinds of machine-operated sprayers, the most common of which are low-pressure, high-pressure, air-carrier, and fogger types.	
23	Motorbikes	A motorcycle, often called a bike, motorbike, or cycle, is a two- or three-wheeled motor vehicle. Purpose is for long distance travel, commuting, for supervisory workers.	

24	Mobile Toilet	The portable toilets used on construction sites and at large gatherings such as music festivals, funeral and parties. As they are usually use for short periods, they are mostly rented rather than bought, often including servicing and cleaning. They are mobile in nature. They come with trucks to move them from one point to another and a dislodge facility.	
25	Motor Tricycle	The truck specially designed with three tires, and less than a tone. They are fuel-efficient and used to collect municipal solid waste and haul the collected waste to a solid waste treatment facility such as a landfill. they are mostly used in areas that are not accessible to bigger trucks	
26	Dump Truck	A dump truck, known also as a dumper truck or tipper truck is used for taking dumps (such as sand, gravel, or demolition waste, or other waste) to dump sites.	
27	Water Tanker	Dust control, compaction, domestic, institutional, even fire prevention are among the uses of these powerful machines. Water trucks are different from regular trucks in that they have special tank specifications, custom chassis design and mounting apparatuses, and associated pumping equipment	
28	Road Sweeper	Road sweepers are vehicles that are used to sweep roads, pavements and other hard surfaces clean and free from debris. Conventional road sweepers use jets underneath the vehicle body to spray water onto the road surface, sweep and collect the debris	

29	Skip Truck	A skip truck is a specialized designed truck for loading skip containers, and moving waste from communal centers to final disposal sites	
30	Cesspit Emptier	The cesspit emptier uses a vacuum pump to extract liquid waste and sludge. Cesspit Emptier come with chassis with 2, 3 or 4 axles, trailers, semi-trailers.	
31	Motor Tricycle (Dump Truck)	The truck specially designed with three tires, and less than a tone, with a capacity of dumping waste collected. They are fuel-efficient and used to collect municipal solid waste and haul the collected waste to a solid waste treatment facility such as a landfill. they are mostly used in areas that are not accessible to bigger trucks	
32	Skip Container	The skips containers are opened, lifted onto a special skip loader wagon by chains, they are rolled onto a wagon with a hook. They are more common as industrial containers and are not suitable for domestic use. They are mobile and detachable from the main truck, and used for solid waste collection. They come in various sizes	
33	Roll-On-Roll-Off Container	The container is designed to be transported by special roll-off trucks. Roll-offs are commonly used to contain loads of construction and demolition waste or other waste types. They are mobile and detachable from the main truck, and used for solid waste collection. They come in various sizes	

34	Dust Bin Carrier Truck	A truck specially designed to collect dustbins from municipalities, with solid waste and haul the collected waste for compaction for further transportation to a landfill.	
35	Compactor Container	Mobile waste compactor container compresses waste materials, minimizing their volume and size, by saving time, energy and fuel in the process of moving waste from residential and corporate environments. It is later convened with a Roll-On-Roll-Off truck for final disposal	
36	Dust Bins	Dustbin a large container with a lid, used for holding rubbish/garbage until due for collection to final disposal sites. They come in various sizes and are used in offices, homes, hospitals, etc Bins are made from robust polyethylene (PE) and in other circumstances they contain a significant amount of recycled plastic	
37	Dustbin Liner	Plastic bags in different sizes often used for lining waste containers or bins, or used as standalone holder of solid waste. This serves to keep the container sanitary by avoiding container contact with the garbage, or spread by wind or pets.	
38	Pay Loader	A pay loader is a heavy equipment machine used to move aside or load materials such as demolition debris, dirt, construction waste, gravel, recycled material, rock, sand, solid waste, etc. into or onto another type of machinery (such as a dump truck, conveyor belt, feed-hopper).	

39	Garbage Compactor	Waste compaction is the process of compacting waste, reducing it in size. Garbage compactors and waste collection vehicles compress waste so that more of it can be stored in the same space. Waste is compacted again, more thoroughly, at the landfill to conserve valuable airspace and to extend the landfill's life span	
40	Bulldozer	A bulldozer or dozer is a crawler (continuous tracked tractor) equipped with a substantial metal plate (known as a blade) used to push large quantities of soil, sand, rubble, or waste. These is normally used in the landfill sites when other trucks dump at one particular location and the bulldozer pushes the waste to level or cover specific area	

Source: Researcher field survey

2.3.3 Housing Characteristics in Ghana

The access to basic utilities, sources of good drinking water, sanitation facilities, and housing are physical characteristics of a household. This used to evaluate the general wellbeing and socio economic sustainability (Ghana Statistical Service, Ghana Health Service, and ICF International 2015). The Millennium Development Goal (MDG) in Africa focuses on environmental sustainability, measured by the access to improved sanitation. Access to safe water and sanitation continues to be one of the predominant health challenges and not mitigating it could result in skin diseases, acute respiratory infections, and diarrheal diseases (WHO, UNICEF 2014). These are preventable diseases if the environment is clean (Van, D. P., Fujiwara, T., Tho, B. L., Toan, P. P. S., & Minh, G. H. 2019).

2.3.4 Municipal Solid Waste Management in Ghana

Accra the capital of Ghana and the largest city has a population of about 2.27 million (2/18/2019 World population review) and is the 11th largest metro area in Africa. The next largest city in Ghana is Kumasi with 1,468,609 total inhabitants (2/18/2019 World population review). From Ghana statistical service report, Greater Accra happens to grow rapidly and is estimated to reach 5,000 in 2020 with current inhabitants to be 4,943,075 (Ghana Statistical Service, February 2019). The region has a faster growth rate of 4% than other cities in Ghana and across Africa. This growth rate has contributed to the myriad of managing municipal waste management problems that face the capital (Agyemang, F. S., Silva, E., & Poku-Boansi, M. 2019; Peprah, C., Amponsah, O., & Oduro, C. 2019). 2800 metric tons of municipal solid waste generated daily in the capital (EPA, 14 July 2014). It's estimated that 2,200 tons are collected leaving backlog of 600 tons daily. The remaining tons fund it way through streets, open drains, stagnant and flowing rivers, and the sea. This mostly causes flooding during the rainy season or at every heavy downpour (Akonnor, E. O. 2018; Basiru, I., Arkorful, V. E., Ashu, H. A., & Lukman, S. 2019).

2.3.5 Service Quality

Service quality in its contemporary conceptualization is the comparison of perceived expectations from customers with apparent performance (Psomas, E. L., & Jaca, C. 2016). This increase competitiveness, effectiveness and flexibility from service provider (Grzinic, 2007). Service quality is an important area that requires management attention for companies to stay in business and become competitive. Service quality assesses how well a delivered work conforms to the client's expectations. Service providers assess service quality provided to customers to improve their work, identify problems, and to better assess their client satisfaction (Ikediashi, D. I., Ogunlana, S. O., & Odesola, I. A. 2015; Frempong, J., Chai, J., & Ampaw, E. 2018). Waste management companies provide services to clients in all shades of life. This includes services to residential apartments or estates, individual houses or homes, ministries, corporate institution or organisations, hotels, quest houses, schools, hospitals and others. These customers are brand loyal to the service providers. The customers pay for the services rendered because moneys are spent and they require

utmost performance. Satisfy clients are likely to return or continue doing business with their service providers because of positive association (Chen, H., Weiler, B., Young, M., & Lee, Y. L. 2016; Thai, V. V. 2016). Quality customer service is link directly to client retention. Characteristics of services are; tangibility - appearances of physical facilities, personnel, and communication materials. Reliability the ability to perform the promised service dependably and accurately, responsiveness – willingness to help customers and provide prompt service. Assurance – knowledge and courtesy of employees and their ability to convey trust and confidence in customers, empathy – caring, individualized customer's attention provided by service providers, perish-ability, heterogeneity of the product, and simultaneity of production and consumption (Yeo, G. T., Thai, V. V., & Roh, S. Y. 2015; Banerjee, S., & Sarkhel, P. 2019). The process of managing service quality delivered to a customer according to his experience or expectation refers to the service quality management. It assesses how well a quality service delivery and to improve its quality in the future, identify problems and correct them to increase customer satisfaction (Guerrini, A., Carvalho, P., Romano, G., Marques, R. C., & Leardini, C. 2017; Banerjee, S., & Sarkhel, P. 2019).

2.3.6 Serqual Approach of Measuring Service Quality

Growth in service sector continues to increase globally in every country. The service sector growth has increase phenomenally because of customer satisfaction and competition among service providers. Research on business development and study of services, innovations are becoming larger portions of company revenue streams. These researches aimed at enhancing performance require reliable methods of measurement, assessment, and improvement (Spohrer and Maglio, 2008). Accurate and reliable instruments that assess service quality are of great interest to companies whose revenue comes from service delivery. The most popular and widely used service quality instrument is SERQUAL (Wattanakamolchai, S., Singal, M., & Murrmann, S. K. 2016). SERVQUAL measuring tool remains the most complete attempt to conceptualize and measure service quality. The main benefit using the SERQUAL is the ability of business developers and researchers to examine numerous service industries such as waste collection management, healthcare, banking, financial services and education (Nyeck, Morales, Ladhari, & Pons, 2002; Guerrini, A., Carvalho, P., Romano, G., Marques, R. C., & Leardini, C. 2017).

2.3.7 Financing Solid Waste

Financing solid waste has been the responsibility of governments, district assemblies, waste management companies and the polluter. The individual, corporate or the organisation that benefits from the services pay for the refuse collected. Payment of disposal of solid waste is no longer the responsibilities of the district or municipal assemblies in some cities residents in Ghana like before. In the residential apartment or estates, residents will have to dispose of their refuse properly according to the environmental health policy in regulating the environment (Boateng, K. S., Agyei-Baffour, P., Boateng, D., Rockson, G. N. K., Mensah, K. A., & Edusei, A. K. 2019). Owners or occupants would have to use the services of waste management providers and be responsible for the charges. Some residents have special arrangement with service providers on how their waste should be pick up from the household. Dwellers in the slums and the zongo communities are provided with skip containers at vantage places and they would have to carry or transfer their waste to the facilities provided. The municipal or district assemblies will be responsible for the payment of the lifting of the generated waste (Nkansah, E., Dafor, N. K., & Essel-Gaisey, F. 2015). In regulating the environment, the polluter principle is applying to make the party responsible for the production of pollution and pay for the damage done to the natural environment. The polluter principle is the commonly accepted practice that those who produce pollution should bear the costs of managing it to prevent damage to human health or the environment (Kiddy-Kodua, J. O., Norman, I. D., & Norvivor, F. A. 2018).

Managing waste is a capital-intensive undertaking and requires financial investment plan. Robust plans and feasibility studies needed to prove return of investment on the infrastructural project in communities. The sources of funding for waste management activities in Ghana includes revenue generated through waste collection from households, apartment, and communities using waste skip containers provided by the district or municipal assemblies. The district assemblies' common fund pays for communities that the waste management services provide them with skip containers (Oduro-Appiah, K., Afful, A., Kotey, V., & de Vries, N. 2019). The challenges in effective waste collection in the service delivery and final disposal includes inadequate funds for waste collection, poor urban and town planning that leads to lack of access routes for waste removal, inadequate sanitation facilities, and bad habits from residents. Inadequate budgetary allocation for funds in managing solid waste activities in the district assemblies, in Ghana and this continues to hinder service delivery in the collection of waste (Boateng, S., Amoako, P., Poku, A. A., Appiah, D. O., & Garsonu, E. K. 2016; Amegah, A. K., & Agyei-Mensah, S. 2017). The district assemblies continue to depend on the government common fund for payment of solid waste management sanitation, to the private sectors who handles the district assemblies' waste collection. This puts stress on the national budget and competes with other infrastructural developments (Oduro-Kwarteng, S., & Dijk, M. P. V. (2017). The Ghana government

priority continues to shift from different infrastructural development to the other and changes in government continue to affect payment to service providers. This makes the district or municipal assemblies turn to self-financing policy reforms and initiatives for sustainable financial security for waste management. This policy reforms have led to the participation of private sectors in waste management collection, transportation and disposal of urban waste (Boateng, K. S., Agyei-Baffour, P., Boateng, D., Rockson, G. N. K., Mensah, K. A., & Edusei, A. K. 2019). Infrastructural development of adequate financing option for delivery waste management services by private service providers and cost recovery mechanisms are the main challenges in urban waste management. The lack of initiative and innovative ways hinders the self-financing and collection of revenue from residents and benefactors (Alhassan, H., Donkoh, S. A., & Boateng, V. F. (2017).

2.3.8. Polluter Pay Principle (PPP) in Financing Solid Waste

The polluter pays principle (PPP) is one of the principles for sustainable environmental development and first recognised by the Organisation for Economic Aspects of Environmental Policies. This is adopted internationally and use mostly in European community serving as their environmental policy. This policy aims to ensure that the polluter bears full or partial cost of environmental damage and the cost associated with controlling pollution (Bhattarai, K. 2015; Feather, C. 2018). The polluter pay principle indicates that the cost incurred during environmental impact might be borne by entities or individuals responsible for environmental impact. The PPP implies that the cost associated with goods and services should reflect their full social cost, production and environmental cost (Alhassan, H., Donkoh, S. A., & Boateng, V. F. 2017; Patrick, I. M. V., Okon, U. E., & Solomon, U. U. 2017; Feather, C. 2018). The principle stress on industry discharges of polluting substances into the environment and the polluter made to pay the resources to control the pollution. This inject into the economic system signals of cost associated with causing environmental damage (Lupo, T., & Cusumano, M. 2018; Yescombe, E. R. 2018). The incorporation of PPP into Ghana Waste Management system has allowed privatization of managing waste bringing improved environmental quality. PPP will be effective depending on institutional structures allowing private sectors in Ghana to handle waste collection and policy framework (Fält, L. 2016; Adam, M. N. 2018; Spoann, V., Fujiwara, T., Seng, B., Lay, C., & Yim, M. 2019). The policy framework must allow compatibility with the objectives adaptable to users, residents and corporate institutions. This policy also has it barriers including poverty, willingness to pay, and the availabilities of resources from the district assemblies (Padi, A., Addor, J., & Nunfam, V. F. 2015; Sulemana, A., Donkor, E. A., Forkuo, E. K., & Oduro-Kwarteng, S. 2018).

3.0 METHODOLOGY

The task of defining the research problem becomes the preparation towards the design of the research work. Research design involves the arrangement of conditions for the collection and analysis from the data. This is done in a manner that aims to combine the relevance from the research objectives. The research design is also the conceptual framework within which the research was conduct. It also constitutes the blue print for collection, measurement and the analysis of data. The design could also include an outline of what the researcher will be doing from the initial writing of the hypothesis and its operational implications to the final analysis of the data (Kothari, C. R., 2004; Edmonds, W. A., & Kennedy, T. D. 2016).

The study is a descriptive cross sectional research with the intent of describing the characteristics of all household or residential apartments in the provision of quality waste management services. The reason for choosing this approach was to; measure service quality among the respondents, and the willingness to pay for quality service delivery from the waste management service providers (Bryman, A. 2016; Bell, E., Bryman, A., & Harley, B. 2018). Guided interviews and questionnaires conducted throughout the country on households that use the services of waste collectors. The researcher explains to the selected households the details of the questions for clarity before answering. The statistical tool for the analysis is the use of SPPS as a measurement tool (Blaikie, N., & Priest, J. 2019).

3.1 Sources of Data

The sources from the data are to provide the necessary input for the analysis to arrive at an outcome for the research. Two sources of data used in this research work were the primary data and secondary data. The primary data was from the fieldwork specifically from respondents on the topic: quality service delivery in solid waste management companies in Ghana (Padgett, D. K. 2016; Bryman, A. 2017; Creswell, J. W., & Clark, V. L. P. 2017; Bell, E., Bryman, A., & Harley, B. 2018; Flick, U. 2018).

Data collection through administering the questionnaires distributed to households or apartments in the regional capitals and some selected district assemblies in Ghana. Secondary data is information sourced from other alternatives by the researcher. For this study, the secondary data obtained is from various publications by authors who have written on the topic under consideration. These publications include periodic journals, textbooks, various

government reports, company websites and online data sources. All cited materials are duly acknowledged in the references (Mertler, C. A., & Reinhart, R. V. 2016; Sekaran, U., &Bougie, R. 2016; Yin, R. K. 2017; Morris, T. P., White, I. R., & Crowther, M. J. 2019).

3.2 Target Population

The target population for this study consists of all regional capitals, cities, and some selected residential apartments or a household that uses the services from solid waste management companies in Ghana. 1820 questionnaires were distributed throughout the country.

3.3 Sampling Technique

The sampling method for this research work was the probability simple random method. This method is to find out the probability reaching to users from the services provided by the waste management companies. This is to give chances to each one of the possible selected households or apartment (Nardi, P. M. 2018; Kumar, Ranjit 2019).

3.4 Samples

A sample is a portion of a population or universe (Tailor, 2005), and a population does not necessarily mean a number of people (Walliman, 2011). Sampling size is a function of the nature of the population, type of data to be use, type of analysis and availability of funds for the study (Saunders et al, 2009). The study will use simple random sampling techniques for the selection of respondents (Iacus, S. M., King, G., & Porro, G. 2019).

3.5 Questionnaires

The instrument used was a research questionnaire. This was design to provide anonymity and encourage respondents to give honest answers. The questions focused on knowledge relating to measuring quality service in delivery in solid waste management companies in Ghana (Mertler, C. A., & Reinhart, R. V. 2016; Kumar, Ranjit 2019).

3.6 Interviews

The respondents for the questionnaires were identify based on their convenience and availability to answer. The purposes of this research and the questionnaires were explained in detail to the respondents so they would not doubt the researcher and to answer correctly. It was also to ensure safe responses and prompt a healthy understanding between the researcher and respondents (Creswell, J. W., & Creswell, J. D.2017; Bell, E., Bryman, A., & Harley, B. 2018; Flick, U. 2018). The period for the distribution and collection of the questionnaires and for conducting interviews was for a period of twelve (12) months. By the end of the period, the researcher was able to recover 1620 out of the 1810 of the questionnaires distributed representing 89.5% valid respondents (Yin, R. K. 2017; Nardi, P. M. 2018; Blaikie, N., & Priest, J. 2019).

3.7 Data Analysis and Detestation

Analysis of the data is by using the Statistical Packages for Science and Solution (SPSS version 17) and Microsoft Excel 2016. The data obtained grouped, coded and fed into the software to generate the analysis and produce the results. Statistical frequency distribution tables and charts used to present the findings for easy interpretation and easy identification of the patterns and relationships between variables (Dawson, C. 2019; Fink, A. 2019; Iacus, S. M., King, G., &Porro, G. 2019; Morris, T. P., White, I. R., & Crowther, M. J. 2019).

4.0 DATA ANALYSIS

This chapter deals with the data presentation and analysis. In this chapter, all data gathered for the study are organized, analysed and this is follow by discussion of key issues relating to the findings of the study. Frequency tables provided to give statistical reflections on key issues in terms of the research questions. The main thrust of the study is to investigate quality service delivery by solid waste management companies in the regional capitals and cities in Ghana.

4.1 Context of Research Sites

The demographic characteristics considered in the study are; respondents regions, place and description of residence, how long have they live in the region, gender, age, level of education or profession, marital status, occupation, and position in the company. The years of experience, number of people in the household or dependent and lastly the gender of people in the household. The demographic characteristics of the respondents helped in determining the extent to which responses provided were valid. Out of the 1810 residential household sampled for the

study, 89.5% (1620) valid questionnaire were retrieved. The achievement was because the selected respondents were convinced of the benefits of the study to the nation.

4.1.1 Primary Research Objectives

The primary objective of this research is to measure quality of service delivery by solid waste management companies in the regional capitals and cities in Ghana.

4.1.2 Regions, Place of Resident, and Description of Capital

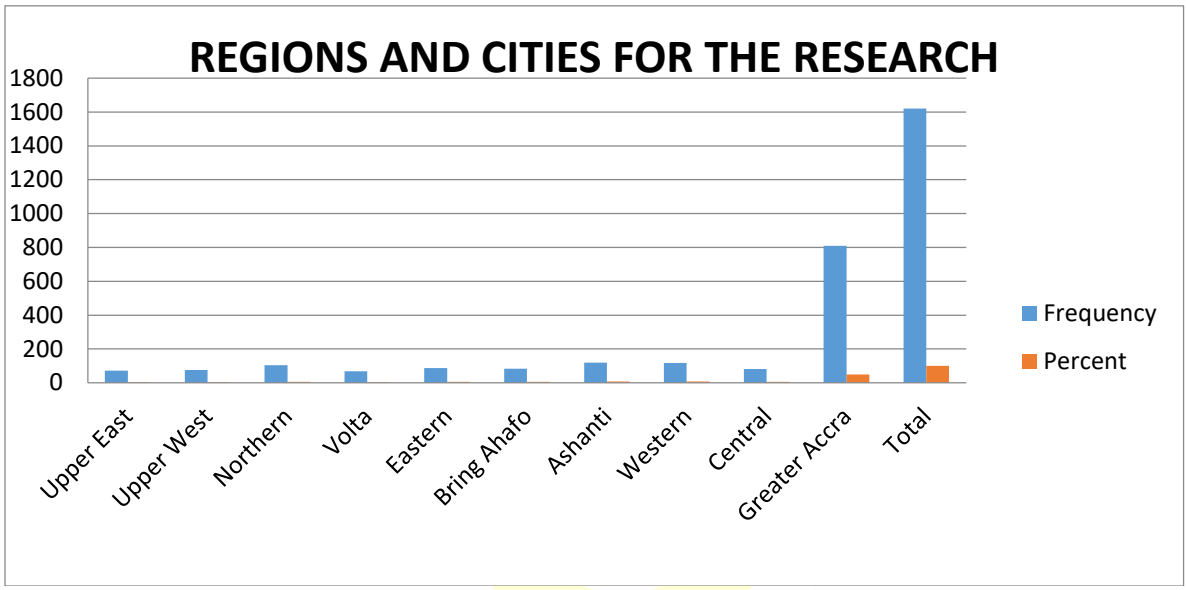


Figure 2**:** Regions of Respondents
Source: Field survey, 2019

From the 1810 structured questionnaires and interview conducted, 1620 respondents were valid for the purpose of the research work. These met the research objective of measuring quality service delivery by solid waste management companies. Out of the 1620 respondent selected, 50% are residential households in the Greater Accra Region. This is so because of the focus group target population of residential communities who uses the services of waste management companies for the research. This was follow by the Northern, Western and Ashanti regions, with frequencies of 6.4%, 7.3%, and 7.4% respectively. Accra the capital and the largest city have more than 5 million of the Ghanaian population with lot of infrastructural developments of residential apartments and estates which was the target for this research work (Fält, L. 2016; Feather, C. 2018).

The Greater Accra Metropolitan Assembly (GAMA) has about 4 million inhabitants and is the 11th largest metropolitan assembly in Africa and the next largest city in Ghana is Kumasi with 1,468,609 total inhabitants (2/18/2019 World population review). From Ghana statistical service report, Accra happens to grow rapidly and with current inhabitants to be 4,943,075 (Ghana Statistical Service, February 2019). The region has a faster growth rate of 4% than other cities in Ghana and across Africa. This growth rate has contributed to the myriad of managing municipal solid waste management problems facing the capital (Adam, M. N. 2018; Sulemana, A., Donkor, E. A., Forkuo, E. K., & Oduro-Kwarteng, S. 2018; Yescombe, E. R. 2018).

4.2 Gender of the Respondents

Out of the total 1620 respondents selected for the study, 884 (54.0%) were males and 736 (46.0%) were females. This suggests that most of the respondents used in the study were males. The details as provided in figure 3.

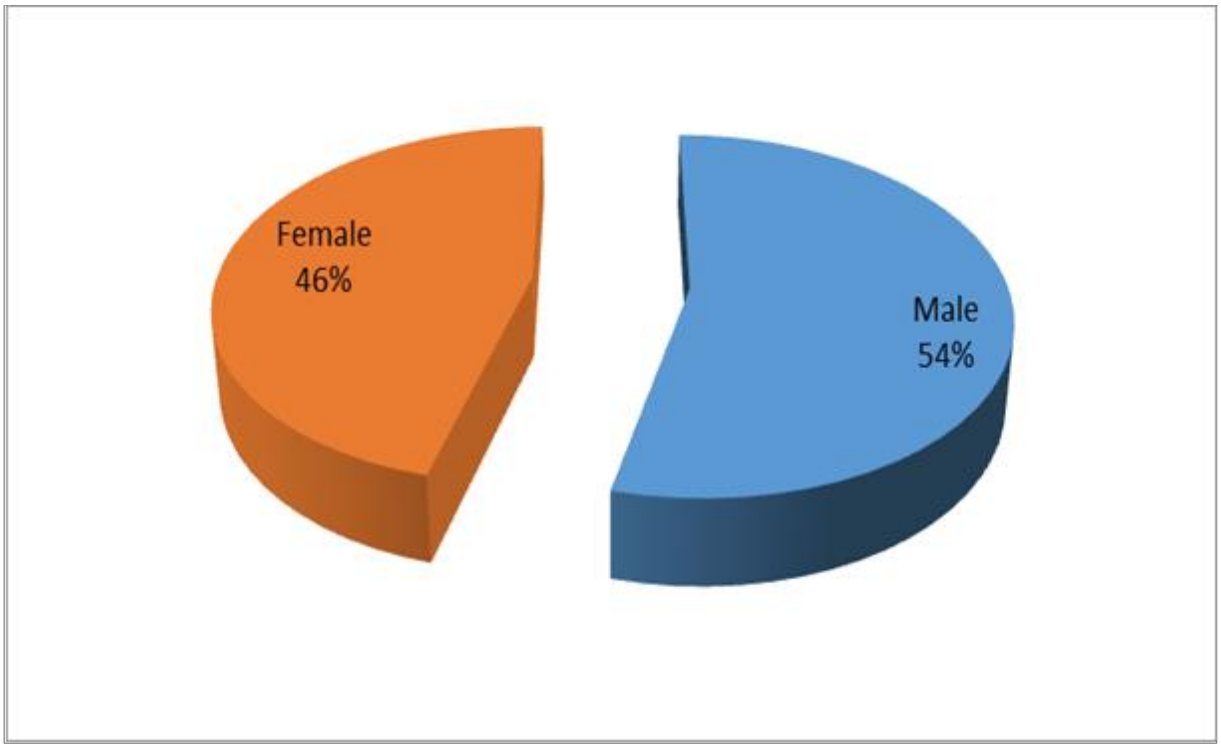


Figure 3: Gender of Respondents
Source: Field survey, 2019.

The male dominance reflects in the ownership and the head of such families in the residential areas. Majority of the males are professionals with the facility provided by their employers.

4.3 Age Distribution of the Respondents

It was necessary to determine the ages of the respondents, since this information would help to know how young or mature the respondents are with emphasis on number of years lived in the household. Table 2 indicates that 88 (5.5%) of the respondents fell below the 20 age bracket. Sixty hundred and twenty-nine (44.9%) and 565 (35.4%) fell in the 20 – 30 and 31 – 40 age brackets respectively. One hundred and ninety-four (12.2%) and 91 (5.7%) of them respectively fell in the 41 – 50 and 51 – 60 age brackets. The remaining 29 (1.8%) fell in the above 60 age bracket. The details are provided in Table 2.

Table 2: Ages of the Respondents

Ages	Frequency	Percent
Below 20 years	88	5.5
20 – 30 years	629	39.4
31 – 40 years	565	35.4
41 – 50 years	194	12.2
51 – 60 years	91	5.7
Above 60 years	29	1.8
Total	**1596**	**100**

Source: Field survey, 2019.

4.4 Highest Educational Level of the Respondents

The data in Table 3 reveals that 64 (4.0%) of the respondents have never been to school, 29 (1.8%) possess primary and JHS certificate, 114 (7.2%) have SHS certificate and 227 (14.3%) possess Diploma/HND. Again, 732 (46.0%) of the respondents had Bachelor's Degree certificate and 385 (24.2%) possess Master's degree certificate. The remaining 39 (2.5%) have PhD certificate. The educational level of the respondents suggests that one needs to attain a certain level of education before living in the higher income residential areas. The details are provided in Table 3.

Table 3: Highest Educational Level of the Respondents

Highest Qualification	Frequency	Percent
Never been to school	64	4.0
Primary and JHS	29	1.8
SHS	114	7.2
Diploma/HND	227	14.3
Bachelor's Degree	732	46.0
Master's Degree	385	24.2
PhD	39	2.5
Total	**1590**	**100**

Source: Field survey, 2019.

4.5. Measuring Quality Service Delivery

4.6 Research Question 1: How do you measure quality of service from the service providers?

The researcher initially did a qualitative study where the sampled respondents indicated their preference for the perception of measuring quality service delivery from waste management companies. The tangibility, intangibility, reliability, responsiveness, assurance and empathy were considered. The sampled interview results replicated into structured questionnaire for easy interpretation. The research question one sought to determine the mode and frequency of the solid waste collection and disposal. First, respondents asked to indicate how they dispose of their refuse and the details of their responses as provided in Table 4.

Table 4: Disposing off Residential Refuse from Respondents

Waste disposal	**Frequency**	**Percent**
Door collection from a contractor	1155	72.6
Tricycles collectors	318	20.0
District assemblies containers	42	2.6
Sharing with my neighbours dustbin	75	4.7
Total	**1590**	**100**

Source: Field survey, 2019.

The data in Table 4 reveals that 1155 (72.6%) of the respondents dispose of their refuse through door collection from a contractor, 318 (20.0%) through tricycles collectors and 42 (2.6%) dispose their refuse by using the district assemblies containers. The remaining 75 (4.7%) of the respondents indicated that they dispose of their refuse by sharing with their neighbours dustbin. It can be deduced that majority of the respondents 92.6 % dispose of their refuse through door collection from a contractor. This assured the researcher that the targeted population for the research achieved. The finding supports the work of Oduro-Kwarteng (2011) and Oduro-Appiah, K., Afful, A., Kotey, V., & de Vries, N. (2019), who concluded that the most residents use door-to-door mode collection service from contractors to dispose of their refuse.

The follow up questions was if the respondents have signed any contract with the service providers who come for their refuse. The reason was to determine the agreed or perceive measurement of service level agreements use to determine performance. Key Performance indicators should be agreeable and to prevent biasness on each other. It serves as a check against performance and empathy. The details of their responses as presented in Table 5.

Table 5: Respondents View on Signing Contract with Service Providers

Response	Frequency	Percent
Yes	949	58.6
No	671	41.4
Total	**1620**	**100**

Source: Field survey, 2019.

The data in Table 5 reveals that as many as 949 (58.6%) of the respondents claimed they have signed contracts with waste management companies to dispose off their refuse. The remaining 671 (41.4%) responded in the negative. A deduction from the above is that the majority of the respondents have signed contracts with their service providers to dispose refuse. This indicates that performance measurement can be check for the terms and condition. It also confirms similar research findings by Adam, M. N. (2018) who research work was on comparative Study of Waste Management and Building Permit in the Accra Metropolitan Assembly (AMA) as his (Doctoral dissertation, University Of Ghana).

Moreover, 1315 (81.2%) of the respondents are satisfied with the services from the waste management service collector whilst 305 (18.8%) disagreed. It can be concluded that majority of the respondents are satisfied with the services of their refuse waste collectors (Guerrini, A., Carvalho, P., Romano, G., Marques, R. C., & Leardini, C. 2017; Lupo, T., & Cusumano, M. 2018; Yescombe, E. R. 2018; Spoann, V., Fujiwara, T., Seng, B., Lay, C., & Yim, M. 2019). Respondents who indicated that they are satisfied with their service providers' services were ask to rate satisfaction of the services delivered. The details of their responses as represented in Table 6.

Table 6: Satisfaction Level of Service Delivered

Satisfaction Rate	Frequency	Percent
Slightly satisfied	144	11.2
Moderately satisfied	666	51.7
Very satisfied	452	35.1
Extremely satisfied	26	2.0
Total	**1288**	**100**

Source: Field survey, 2019.

It is clear from Table 6 that, out of the total respondents who were satisfied with their service providers, 144 (11.2%) stated that they are slightly satisfied while 666 (51.7%) of the respondents were moderately satisfied. Moreover, 452 (35.1%) of them were very satisfied with the services of their waste collectors whilst 26 (2.0%) of them stated that they are extremely satisfied. By implication, majority of the respondents are moderately satisfied with the services of their waste collectors.

In all 88.8%, of the selected population are satisfied with the work performance of the waste management companies. Their expression of satisfaction includes reliability, responsiveness, and assurance from their clients to customer satisfaction hence no need changing their service provider. This confirms findings from similar research work by Boateng, K. S., Agyei-Baffour, P., Boateng, D., Rockson, G. N. K., Mensah, K. A., & Edusei, A. K. (2019), and Edusei, A. K. (2019), on household willingness to pay for improved solid waste management services in four major metropolitan cities in Ghana because of satisfaction. Again, respondents asked to indicate which aspect of the services they like about their waste collectors. The details of the responses as represented in Table 7.

Table 7: Aspect of Service you like About Your Solid Waste Collectors

Satisfaction Rate	Frequency	Percent
Regular and timely lifting	885	70.9
Prompt feedback	56	4.5
Moderate fee charging	307	24.6
Total	**1248**	**100**

Source: Field survey, 2019.

It could be seen from Table 7 that 885 (70.9%) of the respondents revealed that their solid waste collectors are regular and timely lifting and 56 (4.5%) of the respondents indicated that their solid waste collectors provide prompt feedback. The remaining 307 (24.6%) of the respondents indicated that they like their solid waste collectors because of their moderate charges. It can be concluded that majority of the respondents are very confident in the waste management service providers as prove of similar findings from Akhtar, S., Ahmad, A. S., Qureshi, M. I., & Shahraz, S. 2017; Guibrunet L. 2019; Almazán-Casali S., Alfaro J.F., Sikra S. 2019. The selected respondents were asked how often their solid waste collectors pick their refuse for disposal. Table 8 shows the outcome that emerged from their responses.

Table 8: Frequency of Waste Collection

Frequency	Frequency	Percent %
Once a week	1086	67.0
Twice in a month	5	0.3
Twice in a week	434	26.8
Whenever I call	4	0.2
Once in a month	76	4.7
Daily	4	0.2
Once in two weeks	4	0.2
Not consistent	4	0.2

Not specific	2	0.1
One or more days	1	0.1
Total	**1620**	**100**

Source: Field survey, 2019.

The data in Table 8 reveals 1086 (67.0%) respondents stated that the waste management companies collected their solid wastes for disposal once in a week. A good sign of clean environmental management practice (Annepu, R., & Themelis, N. J. 2013; Francis Xavier, M. K., Millar, D., & Tanguo, J. 2018). Again, 5 (0.3%) of respondent's waste was collected for disposal twice in a month. Still from the table, about 434 (26.8%) indicated that their waste was collected for disposal twice in a week. Also, 4 (0.2%) had their waste collected whenever they call them, daily, once in two weeks and not consistent respectively. About 76 (4.7%) of the respondents said their waste was collected for disposal once in a month. It implies their waste will overflow, get rotten and produce bad scent and this affirms Abraham, E. M., Martin, A. M., & Cofie, O. (2018), statement that in such situations solid waste are indiscriminately dumped into gutters, drains and roadside. Only 2 (0.1%) had their waste collected for disposal at irregular intervals. Definitely, 1 (0.1%) of the respondents indicated that their waste collectors collect their waste for disposal for one or more days. In all more than two thirds of the respondents, prefer their waste to lift once in a week, which confirms the followed up questions and the research work by Abraham, E. M., Martin, A. M., & Cofie, O. (2018) and Francis Xavier, M. K., Millar, D., & Tanguo, J. (2018).

4.7 Research Question 2: Assess the willingness to pay for the services provided by the waste management companies.

In trying to answer the research question above, respondents were asked whether they pay for disposing off their waste or not. The details of their responses are represented in Table 9.

Table 9: Respondents View on Paying for Disposing off Waste

Response	Frequency	Percent
Yes	1449	89.4
No	91	5.6
No idea	80	4.9
Total	**1620**	**100**

Source: Field survey, 2019.

The data in Table 9 reveals that as many as 1449 (89.4%) of the respondents claimed they pay for disposing off their waste whilst 91 (5.6%) of the respondents indicated otherwise in the negative. The remaining 80 (4.9%) responded that they do not have any idea about it. A deduction from the above is that the majority of the respondents pay for disposing off their waste. This confirms the findings from Boateng, K. S., Agyei-Baffour, P., Boateng, D., Rockson, G. N. K., Mensah, K. A., & Edusei, A. K. (2019) on household willingness to pay for improved solid waste management services in four major metropolitan cities in Ghana. To identify the amount charged for dumping, respondents were asked how much they pay collecting their refuse. The details of their responses are presented in Table 10.

Table 10: Amount Paid for Waste Collection

Amount paid	Frequency	Percent
GH¢ 1 – 50	987	61.2
GH¢ 51 – 100	441	27.3
GH¢ 101 – 150	93	5.8
GH¢ 151 – 200	9	0.6
GH¢ 201 – 250	76	4.7
GH¢ 251 – 300	3	0.1
GH¢ 301 – 350	4	0.2
GH¢ 351 – 400	2	0.1
Total	**1615**	**100**

Source: Field survey, 2019.

The findings in Table 10 shows that 987 (61.2%) of the respondents responded that they pay between GH¢ 1 – 50 for their waste collection, 441 (27.3%) of them pay between GH¢ 51 – 100 and 93 (5.8%) of them pay between GH¢ 101 – 150. Again, 9 (0.6%) of the respondents indicated that they pay between GH¢ 151 – 200 for their waste collection, 76 (4.7%) of them pay between GH¢ 201 – 250 and 3 (0.1%) of the respondents also pay between GH¢

251 – 300. Furthermore, 4 (0.2%) of the respondents revealed that they pay between GH¢ 301 – 350 for their waste collection while 2 (0.1%) of them pay between GH¢ 351 – 400. The question is why the differences in the fee paid for dumping? The difference in payment emanates from the regions and the service provider handling that residential apartment. A residential household who purchased their own dustbins which happens to be the majority 61.2% monthly payment is up to GH 50. The difference as asked was on the equipment used in collection of refuse. Equipments like tricycle, borla taxi rates are lesser as compared to skip and compassion trucks. The higher payments as asked from the waste management companies further explain that such residential apartments did not initially purchased the 240 Liters dustbins, hence their monthly bill charges is inclusive of the dustbins and the refuse collection. This confirms the earlier findings of Nkansah, E., Dafor, N. K., & Essel-Gaisey, F. (2015) on willingness to pay for solid waste dumplings. Respondents were asked to indicate how payment is done for their waste collection and the details are provided in Table 11.

Table 11: Mode of Payment of Waste Collection

Mode of Payment	Frequency	Percent
Revenue collector	836	55.8
Pay to truck drivers	577	38.5
Pay directly to service providers	72	4.8
Through bank	12	0.8
Total	**1497**	**100**

Source: Field survey, 2019.

It was also observed from Table 11 that 836 (55.8%) of the respondents pay their waste collectors through their revenue collectors, 577 (38.5%) pay to the truck drivers and 72 (4.8%) pay directly to the waste collectors offices. On the contrary, 12 (0.8%) pay their waste collectors through the banks. It can be concluded that majority of the respondents pay their waste collectors through their waste collectors revenue collectors. This contradict the previous studies of Padi, A., Addor, J., & Nunfam, V. F. (2015), Boateng, S., Amoako, P., Poku, A. A., Appiah, D. O., & Garsonu, E. K. (2016), done in Takoradi and Kumasi metropolis which states that payment of waste collection is to the district assembly. However, the result confirms the study of (Adam, M. N. 2018; Sulemana, A., Donkor, E. A., Forkuo, E. K., & Oduro-Kwarteng, S. 2018; Yescombe, E. R. 2018).

Respondents were further asked who should pay for their waste collection. The responses were varying and the details are provided in Table 12.

Table 12: Distribution of Who Should Pay for Waste Collection

Who should pay	Frequency	Percent
Landlord/estate developer	128	8.4
Local assembly	189	12.4
Self-payment	1209	79.2
Total	**1526**	**100**

Source: Field survey, 2019.

As shown in Table 12, 128 (8.4%) of the respondents indicated that their landlords or estate developers should pay for their waste collection money and 189 (12.4%) also stated that their local assembly should pay for their waste collection money. However, 1209 (79.2%) of the respondents agree that they should pay for their waste collection money. It can be deduced that majority of the respondents agree that they should pay for their waste collection money. This supports the findings from similar research by: Bhattarai, K. (2015); in India, Nepal, Andrianisa, H. A., & Brou, Y. O. (2016); in Abidjan, Côte d'Ivoire, Patrick, I. M. V., Okon, U. E., & Solomon, U. U. (2017); in Nigeria, Boateng, K. S., Agyei-Baffour, P., Boateng, D., Rockson, G. N. K., Mensah, K. A., & Edusei, A. K. (2019); in Ghana on four major metropolitan cities on household willingness to pay for improved solid waste management services.

4.8 Testing of Hypotheses

There is no statistically significant difference comparing quality service delivery by waste management companies with satisfaction from heads of households. H_o There is no significant relationship between amount residents paid for waste disposal and quality of service. H_o There is no significant relationship between households with or without dustbins and satisfaction with waste management service. H_o There is no significant difference between services provided and clients' expectation on delivery service quality.

4.9 Conclusions from Field Work

In conclusion, the research was valid meeting the research objectives stated. Majority of the heads in the household's interview were satisfy with the services of the solid waste management companies.

5.0 EVALUATION OF THE RESEARCH

This chapter presents a summary of the findings, conclusion and outlines of recommendations including areas for further research. The study investigated quality service delivery by solid waste management companies in the regional capitals and cities in Ghana. The primary objective was measuring quality service delivery from solid waste management companies. This was a cross sectional survey research using structured interviews and questionnaires. Almost all residential households were satisfied with the service providers. Statistical Packages for Science and Solution (SPSS) version 21.0 was the software used for the data analysis. The total respondents for the research work were 1620. Frequency tables, Pie and bar charts, were use in presenting the data. Conclusions from relevant related literature were capture along to authenticate the findings of the study.

5.1 FINDINGS AND DISCOVERIES

The summary of the findings are as follows: The socioeconomic characteristics of residential households have impacts on quality service satisfaction and willingness to pay for the waste collection. Satisfaction and willingness to pay for solid waste management is associated with income, gender, level of education, age, quantity of waste generated, and number of people per household. The Greater Accra Region had the highest respondent with a lot of residential apartment meeting half of the targeted population for this research. This was follow by the Northern, Western and Ashanti regions respectively. Majority of the household heads were males with percentage of 54%. 74.8% of the respondents were in their reproductive age, working class and generated waste per income. 87.0% of the respondents were graduates with education qualification between HND to PhD.

The results indicate that 92.6% of Ghanaian in residential areas now use the services of waste management companies and have contractual arrangement with agreed service level payable monthly or weekly. The few 2.6 uses the skip containers provided by the district assemblies. 4.7% of the targeted population continues to share their waste with neighbors and is not surprising as few bachelors' respondents indicate not producing waste hence the need to use neighbors' waste dustbins.

Most medium and high income earners interviewed are really satisfy with their waste management service providers revealing a percentage of 88.8% as satisfied for waste collection. The expression of satisfaction characteristics are reliability, responsiveness, and assurance from their waste management service providers. The respondents 70.9% were satisfy with regular and timely lifting of their solid generated waste with assuring feedback incase a truck is not coming to pick up the refuse. They were happy with the service moderate fee charges for waste collection. Overflow of refuse is now reducing in most residential areas willing to pay for waste generated. 67.0% agreed to the terms of refuse lifted once in a week and 26.8% indicated their refuse lifted twice weekly and do pay higher charges and perhaps generate more waste because of the number of people in the households.

Willingness to pay for waste management depends on several environmental and socioeconomic factors. Eighty-nine and four (89.4%) from the survey indicate their willingness to pay for improve service. These indicate positive attitudes from households in residential areas. Majority paid GH 20 to 50 for service charges on waste collection per month with payments made directly to waste management revenue collectors. 79.2% do pay to their service providers and this indicates the satisfaction rate about the waste management companies.

5.2 Limitations from the Study

The limitation of this study was the targeted population from respondents in residential apartments that could have extended to low income earners in non-residential areas. This is so because of limit to funds and not extending it cover lower income other households. The research done in all the ten regional capitals and the budget was high hence limiting it to medium and high-income residential areas in the regional capitals and cities in Ghana. The findings from this study represent sampled respondents for this research work from the ten regional capitals of Ghana. In spite of this, the study can be analytical generalize where findings can be generalized to similar circumstances. This can be assuring as the study used broad-based and in-depth understanding through the production of rich and diverse empirical evidence (Myers, 2008).

In addition, one of the limitations of this study is the issue of validity and reliability. Reliability examines the extent for the method used in data collection. This will provide reliable results in such a manner that other researchers could draw comparable conclusions. It also deals with consistency of results over time, the correct representation of the total population in the study and whether results can be reproduce using similar methodology (Saunders, Lewis & Thornhil, 2007).

Validity also deals with the soundness and strength of the findings of the study and its ability to persuade the audience to pay attention to the findings of the study. The researcher addressed reliability and validity concerns by integrating data sources and collection methods, which enhance the quality of results, obtained using the qualitative approach (Myers, 2008).

5.3 Recommendations

From the summary of the findings, below are the recommendations. I recommend that the government in collaboration with waste management companies invest more resources into construction of recycling plants that will help in dealing more efficiently and effectively with waste disposal challenges. All household should have a dustbin irrespective of the location. The responsibility from the service provider will now be to lifting the generated waste regularly. Revenue collectors from service providers should make frantic efforts and developed strategies to reach residents for payment.

The district assemblies should regulate the activities of the waste management companies especially the district environmental health officers who are responsible for community health centers and diseases control. There should be mass spraying in residential communities or apartment areas as was detected during the survey that rodents feed on the organic components of generated waste and transmit pest and diseases to other households. Educational campaigns of the various metropolitan and municipal assemblies on good sanitation practices should in intensified to increase the awareness to household.

5.4 Further Study and Research

With the government of Ghana and the district assemblies being a major player in the country waste and sanitation systems, the government or other donor agencies could sponsor such research to cover low-income areas. Other researchers can research to investigate on risk and challenges of financing solid waste management in Ghana. Similar research study can be done on developing key performance indicators and measuring tools for assessing waste management companies.

5.5 Conclusions

The research findings prove that majority of occupants in residential areas in the country are satisfy with the services provided by waste management companies. Almost or higher proportion of the respondents satisfy with the services provided by waste management companies are willing to pay for improve delivery. The study concludes that educational level, number of dependents, gender of household, income, and the location of residents influence household satisfaction from waste management companies. These factors also influence the willingness to pay for the service.

References

Abraham, E. M., Martin, A. M., & Cofie, O. (2018). Environmental sanitation and pollution control measures in the Odaw-Korle River catchment, Ghana. *Development in Practice*, *28*(7), 964-973.

Achankeng, E. (2003, October). Globalization, urbanization and municipal solid waste management in Africa. In *Proceedings of the African Studies Association of Australasia and the Pacific 26th annual conference*.

Adam, M. N. (2018). *The Politics of Service Delivery in Local Governance Units in Ghana: A Comparative Study of Waste Management and Building Permit in the Accra Metropolitan Assembly (AMA)* (Doctoral dissertation, University Of Ghana)

Agbefe, L. E., Lawson, E. T., & Yirenya-Tawiah, D. (2019). Awareness on waste segregation at source and willingness to pay for collection service in selected markets in Ga West Municipality, Accra, Ghana. *Journal of Material Cycles and Waste Management*, 1-10.

Agyemang, F. S., Silva, E., & Poku-Boansi, M. (2019). Understanding the urban spatial structure of Sub-Saharan African cities using the case of urban development patterns of a Ghanaian city-region. *Habitat International*, *85*, 21-33.

Akaateba, M. A., & Yakubu, I. (2013). HOUSEHOLDERS'SATISFACTION TOWARDS SOLID WASTE COLLECTION SERVICES OF ZOOMLION GHANA LTD IN WA, GHANA. *European Scientific Journal, ESJ*, *9*(32).

Akhtar, S., Ahmad, A. S., Qureshi, M. I., & Shahraz, S. (2017). Households willingness to pay for improved solid waste management. *Global Journal of Environmental Science and Management*, *3*(2), 143-152.

Akonnor, E. O. (2018). *DEPARTMENT OF PUBLIC ADMINISTRATION AND HEALTH SERVICES MANAGEMENT* (Doctoral dissertation, University of Ghana).

Alhassan, H., Asante, F. A., Oteng-Ababio, M., & Bawakyillenuo, S. (2017). Do socio-psychological factors influence households' willingness-to-pay for improved solid waste management services? Evidence from Ghana. *International Journal of Green Economics*, *11*(3-4), 183-203.

Alhassan, H., Donkoh, S. A., & Boateng, V. F. (2017). HOUSEHOLDS'WILLINGNESS TO PAY FOR IMPROVED SOLID WASTE MANAGEMENT IN TAMALE METROPOLITAN AREA, NORTHERN GHANA. *UDS International Journal of Development*, *3*(2), 70-84.

Almazán-Casali S., Alfaro J.F., Sikra S. (2019) Exploring household willingness to participate in solid waste collection services in Liberia, Habitat International, Volume 84, 2019.

Almeida, H., Hankins, K. W., & Williams, R. (2017). Risk management with supply contracts. *The Review of Financial Studies*, *30*(12), 4179-4215.

Amegah, A. K., & Agyei-Mensah, S. (2017). Urban air pollution in Sub-Saharan Africa: Time for action. *Environmental Pollution*, *220*, 738-743.
Amoah, S. T., & Kosoe, E. A. (2014). Solid waste management in urban areas of Ghana: issues and experiences from Wa.

Andrianisa, H. A., & Brou, Y. O. (2016). Role and importance of informal collectors in the municipal waste pre-collection system in Abidjan, Côte d'Ivoire. *Habitat International*, *53*, 265-273.

Annepu, R., & Themelis, N. J. (2013). Analysis of waste management in Accra, Ghana and recommendations for further improvements. *New York: Earth Engineering Center, Columbia University*.

Araujo, M. (2018). An Efficient and Sustainable Waste Management Plan for Abby's House.
Ashiagbor, D., Deiana, R., Kappeler, A., Minsat, A., & Nguyen-Quoc, T. (2018). 9. Financing Infrastructure in Africa. *Banking in Africa*, 201.

Asibey, M. O., Amponsah, O., & Yeboah, V. (2019). Solid waste management in informal urban neighbourhoods. Occupational safety and health practices among tricycle operators in Kumasi, Ghana. *International journal of environmental health research*, 1-16.

Awunyo-Vitor, D., Ishak, S., & Seidu Jasaw, G. (2013). Urban Households' willingness to pay for improved solid waste disposal services in Kumasi Metropolis, Ghana. *Urban Studies Research*, *2013*.

Bahrami, A., Soltani, N., Pech-Canul, M. I., & Gutiérrez, C. A. (2016). Development of metal-matrix composites from industrial/agricultural waste materials and their derivatives. *Critical Reviews in Environmental Science and Technology*, *46*(2), 143-208.

Banerjee, S., & Sarkhel, P. (2019). Municipal solid waste management, household and local government participation: a cross country analysis. *Journal of Environmental Planning and Management*, 1-26.

Banerjee, S., & Sarkhel, P. (2019). Municipal solid waste management, household and local government participation: a cross country analysis. *Journal of Environmental Planning and Management*, 1-26.

Bascom, W. O. (2016). *The economics of financial reform in developing countries*. Springer.

Basiru, I., Arkorful, V. E., Ashu, H. A., & Lukman, S. (2019). Challenges Affecting Sustainability of National Sanitation Day (NSD) Programme in Ghana. *Journal of Health and Medical Sciences*, *2*(1), 58-67.

Bell, E., Bryman, A., & Harley, B. (2018). *Business research methods*. Oxford university press.
Bernard, H. R. (2017). *Research methods in anthropology: Qualitative and quantitative approaches*. Rowman & Littlefield

Bhattarai, K. (2015). Households' willingness to pay for improved solid waste management in Banepa municipality, Nepal. *Environment and Natural Resources Journal*, *13*(2), 14-25.

Binder, J. (2016). *Global project management: communication, collaboration and management across borders*. Routledge.

Blaikie, N., & Priest, J. (2019). *Designing social research: The logic of anticipation*. John Wiley & Sons.
Boardman, A. E., Greenberg, D. H., Vining, A. R., & Weimer, D. L. (2017). *Cost-benefit analysis: concepts and practice*. Cambridge University Press.

Boateng, K. S., Agyei-Baffour, P., Boateng, D., Rockson, G. N. K., Mensah, K. A., & Edusei, A. K. (2019). Household Willingness-to-Pay for Improved Solid Waste Management Services in Four Major Metropolitan Cities in Ghana. *Journal of environmental and public health*, *2019*.

Boateng, S., Amoako, P., Poku, A. A., Appiah, D. O., & Garsonu, E. K. (2016). Household willingness to pay for solid waste disposal services in urban Ghana: The Kumasi metropolis situation. *Ghana Journal of Geography*, *8*(2), 1-17.
Brink, C. H. (2017). *Measuring political risk: risks to foreign investment*. Routledge.
Bryman, A. (2016). *Social research methods*. Oxford university press.
Bryman, A. (2017). Quantitative and qualitative research: further reflections on their integration. In *Mixing methods: Qualitative and quantitative research* (pp. 57-78). Routledge.
Burtonshaw-Gunn, S. A. (2017). *Risk and financial management in construction*. Routledge.
Chen, H., Weiler, B., Young, M., & Lee, Y. L. (2016). Conceptualizing and measuring service quality: towards consistency and clarity in its application to travel agencies in China. *Journal of Quality Assurance in Hospitality & Tourism*, *17*(4), 516-541.
Chen, P., Xie, Q., Addy, M., Zhou, W., Liu, Y., Wang, Y., ... & Ruan, R. (2016). Utilization of municipal solid and liquid wastes for bioenergy and bioproducts production. *Bioresource technology*, *215*, 163-172.
Christensen, T. (Ed.). (2011). *Solid waste technology and management*. John Wiley & Sons.
Cobbinah, P. B., & Adams, E. A. (2018). Urbanization and Electric Power Crisis in Ghana: Trends, Policies, and Socio-Economic Implications. In *Urbanization and Its Impact on Socio-Economic Growth in Developing Regions* (pp. 262-284). IGI Global.

Creswell, J. W., & Clark, V. L. P. (2017). *Designing and conducting mixed methods research*. Sage publications.
Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage publications.
Danquah, J. K., Analoui, F., & Koomson, Y. E. D. (2018). An evaluation of donor agencies' policies on participatory development: The case of Ghana. *Development Policy Review*, *36*, O138-O158.

Dansoh, A., Frimpong, S., & Oteng, D. (2017). Industry environment features influencing construction innovation in a developing country: a case study of four projects in Ghana. *International Journal of Technological Learning, Innovation and Development*, *9*(1), 65-95.

Daum, K., Stoler, J., & Grant, R. (2017). Toward a more sustainable trajectory for E-waste Policy: A review of a decade of E-waste research in Accra, Ghana. *International journal of environmental research and public health*, *14*(2), 135.
Dawson, C. (2019). *Introduction to Research Methods 5th Edition: A Practical Guide for Anyone Undertaking a Research Project*. Robinson.
Delmon, J. (2017). *Public-private partnership projects in infrastructure: an essential guide for policy makers*. Cambridge University Press.
Doron, A. (2018). *Waste of a Nation: Garbage and Growth in India*. Harvard University Press.

Edmonds, W. A., & Kennedy, T. D. (2016). *An applied guide to research designs: Quantitative, qualitative, and mixed methods*. Sage Publications.
Edwards, R. D., Magee, J., & Bassetti, W. H. C. (2018). *Technical analysis of stock trends*. CRC press.

Fält, L. (2016, December). From shacks to skyscrapers: multiple spatial rationalities and urban transformation in Accra, Ghana. In *Urban Forum* (Vol. 27, No. 4, pp. 465-486). Springer Netherlands.
Feather, C. (2018). Municipal finance for housing: local government approaches to financing housing in cities. *Commonwealth Journal of Local Governance*, ID-6517.
Fiave, R. E. (2017, December). Sekondi-Takoradi as an oil city. In *Geography Research Forum* (Vol. 37, No. December, pp. 61-79).

Fink, A. (2019). *Conducting research literature reviews: from the Internet to paper*. Sage Publications.

Flick, U. (2018). *An introduction to qualitative research*. Sage Publications Limited.

Fobil, J. N., Armah, N. A., Hogarh, J. N., & Carboo, D. (2008). The influence of institutions and organizations on urban waste collection systems: an analysis of waste collection system in Accra, Ghana (1985–2000). *Journal of environmental management*, *86*(1), 262-271.

Francis Xavier, M. K., Millar, D., & Tanguo, J. (2018). An Effective Solid Waste Management and Environmental sanitation Diseases Reduction Module of Ghana-A Case of Thetechiman Municipal Area, Brong Ahafo Region. *Ghana. J Environ Toxicol Stud*, *2*(1)
Frempong, J., Chai, J., & Ampaw, E. (2018). Effects of waste management customer online value co-creation on sanitation attitude and advocacy: A customer-enterprise dyadic perspective. *Sustainability*, *10*(7), 2557.
Furlong, C., De Silva, S., Gan, K., Guthrie, L., & Considine, R. (2017). Risk management, financial evaluation and funding for wastewater and stormwater reuse projects. *Journal of environmental management*, *191*, 83-95.

Gelman, A., Stern, H. S., Carlin, J. B., Dunson, D. B., Vehtari, A., & Rubin, D. B. (2013). *Bayesian data analysis*. Chapman and Hall/CRC.
Ghana Population. (2019-02-18). Retrieved 2019-03-30, from http://worldpopulationreview.com/countries/ghana/

Ghosh, A., Sarkar, J. P., & Das, B. (2019). Effect of Physical Presence of Waste Plastics in the Degradation of Municipal Solid Waste in Landfill. In *Waste Valorisation and Recycling* (pp. 93-103). Springer, Singapore.
Giambona, E., Graham, J. R., & Harvey, C. R. (2017). The management of political risk. *Journal of International Business Studies*, *48*(4), 523-533.
Glossary of Environment Statistics, Studies in Methods, Series F, No. 67, United Nations, New York, 1997.Sep 25, 2001

Gotze, U., Northcott, D., & Schuster, P. (2016). *INVESTMENT APPRAISAL*. SPRINGER-VERLAG BERLIN AN.

Guerrini, A., Carvalho, P., Romano, G., Marques, R. C., & Leardini, C. (2017). Assessing efficiency drivers in municipal solid waste collection services through a non-parametric method. *Journal of cleaner production*, *147*, 431-441.
Guibrunet L. (2019) What is “informal” in informal waste management? Insights from the case of waste collection in the Tepito neighbourhood, Mexico CityWaste Management, Volume 86, 2019

Halpin, D. W., Lucko, G., & Senior, B. A. (2017). *Construction management*. John Wiley & Sons.

Haroun, A. (2017). Healthy Cities in Africa: a continent of difference. In *Healthy Cities* (pp. 89-132). Springer, New York, NY.

Harrison, F., & Lock, D. (2017). *Advanced project management: a structured approach*. Routledge.

Hartmann C., (2018) Waste picker livelihoods and inclusive neoliberal municipal solid waste management policies: The case of the La Chureca garbage dump site in Managua, Nicaragua

Heagney, J. (2016). *Fundamentals of project management*. Amacom.

Heldman, K. (2018). *Project management jumpstart*. John Wiley & Sons.
Henze, M. (1997). Waste design for households with respect to water, organics and nutrients. *Water Science and Technology*, *35*(9), 113-120.
Hirst, P., Thompson, G., & Bromley, S. (2015). *Globalization in question*. John Wiley & Sons.

Hope, O. K., & Vyas, D. (2017). Private company finance and financial reporting. *Accounting and Business Research*, *47*(5), 506-537.

Hurd, J., Hennink, M., Robb, K., Null, C., Peprah, D., Wellington, N., ... & Moe, C. L. (2017). Behavioral influences on risk of exposure to fecal contamination in low-resource neighborhoods in Accra, Ghana. *Journal of Water, Sanitation and Hygiene for Development*, *7*(2), 300-311.

Iacus, S. M., King, G., & Porro, G. (2019). A theory of statistical inference for matching methods in causal research. *Political Analysis*, *27*(1), 46-68.
Ikediashi, D. I., Ogunlana, S. O., & Odesola, I. A. (2015). Service quality and user satisfaction of outsourced facilities management (FM) services in Nigeria's public hospitals. *Built Environment Project and Asset Management*, *5*(4), 363-379.
Kien, A. H. (2018). *A Gender Perspective of Municipal Solid Waste Generation and Management in the City of Bamenda, Cameroon*. Langaa RPCIG.

Kivilä, J., Martinsuo, M., & Vuorinen, L. (2017). Sustainable project management through project control in infrastructure projects. *International Journal of Project Management*, *35*(6), 1167-1183.

Komakech, A. J., Sundberg, C., Jönsson, H., & Vinnerås, B. (2015). Life cycle assessment of biodegradable waste treatment systems for sub-Saharan African cities. *Resources, Conservation and Recycling*, *99*, 100-110.
Kumar, Ranjit *Research methodology: A step-by-step guide for beginners*. Sage Publications Limited, 2019.
Kwaning, C. O., Nyantakyi, K., & Kyereh, B. (2015). The challenges behind smes' access to debts financing in the Ghanaian financial market. *International, Journal of Small Business and Entrepreneurship Research*, *3*(2), 16-30.

Labys, W. C. (2017). *Modeling and forecasting primary commodity prices*. Routledge.

Lagerkvist, A., & Dahlén, L. (2019). Solid Waste Generation and Characterization. *Recovery of Materials and Energy from Urban Wastes: A Volume in the Encyclopedia of Sustainability Science and Technology*, *Second Edition*, 7-20.
Lasa, Y. M., Ahmad, N., & Takim, R. (2015). Critical success factors in obtaining project financing for private finance initiative projects in Malaysia. In *31st Annual Association of Researchers in Construction Management Conference, ARCOM 2015*. Association of Researchers in Construction Management.

Lasa, Y. M., Takim, R., & Ahmad, N. (2018). Sources of Financing for Public Private Partnership Projects: Lesson Learnt from Malaysia. *Indian Journal of Science and Technology*, *11*(20)
Lasserre, P. (2017). *Global strategic management*. Macmillan International Higher Education.

Lee, C. W., & Zhong, J. (2015). Financing and risk management of renewable energy projects with a hybrid bond. *Renewable Energy*, *75*, 779-787.

Letcher, T. M., & Vallero, D. A. (Eds.). (2019). *Waste: A handbook for management*. Academic Press.

Little, R. J., & Rubin, D. B. (2019). *Statistical analysis with missing data* (Vol. 793). Wiley.
Liu, J., Jin, F., Xie, Q., & Skitmore, M. (2017). Improving risk assessment in financial feasibility of international engineering projects: A risk driver perspective. *International Journal of Project Management*, *35*(2), 204-211.

Lock, D. (2017). *The essentials of project management*. Routledge.

Lohri, C. R., Camenzind, E. J., & Zurbrügg, C. (2014). Financial sustainability in municipal solid waste management–Costs and revenues in Bahir Dar, Ethiopia. *Waste Management*, *34*(2), 542-552.

Lupo, T., & Cusumano, M. (2018). Towards more equity concerning quality of Urban Waste Management services in the context of cities. *Journal of cleaner production*, *171*, 1324-1341.
Madara, D. S., & Namango, S. (2018). Solid waste management at a University campus (Part 3/10): waste generators, current practices, and compliance with relevant-law-provisions.
Magni, C. A. (2015). Investment, financing and the role of ROA and WACC in value creation. *European Journal of Operational Research*, *244*(3), 855-866.
Mahamah, R. A. (2019). *NATURE AND CAUSES OF SOLID WASTE CRIME AT DAMONGO IN THE NORTHERN REGION OF GHANA* (Doctoral dissertation).

Mariwah, S. (2012). Institutional arrangements for managing solid waste in the Shama-Ahanta-East Metropolis, Ghana. *Journal of Sustainable Development in Africa*, *14*(6), 292-311.

McCusker, K., & Gunaydin, S. (2015). Research using qualitative, quantitative or mixed methods and choice based on the research. *Perfusion*, *30*(7), 537-542.
McNabb, D. E. (2015). *Research methods for political science: Quantitative and qualitative methods*. Routledge.
Mertler, C. A., & Reinhart, R. V. (2016). *Advanced and multivariate statistical methods: Practical application and interpretation*. Routledge.
Mmereki, D., Li, B., Baldwin, A., & Hong, L. (2016). The generation, composition, collection, treatment and disposal system, and impact of E-waste. In *E-Waste in Transition-From Pollution to Resource*. IntechOpen.

Moh, Y. (2017). Solid waste management transformation and future challenges of source separation and recycling practice in Malaysia. *Resources, Conservation and Recycling*, *116*, 1-14.
Mohammed, A., & Elias, E. (2017). Domestic solid waste management and its environmental impacts in Addis Ababa city. *Journal of Environment and Waste Management*, *4*(1), 194-203.

Mohan G., Yadav A.K. (2019) Multi-stakeholder Partnership for Managing Solid Waste: A Case Study of ITC Limited. In: Ghosh S. (eds) Waste Management and Resource Efficiency. Springer, Singapore

Morris, T. P., White, I. R., & Crowther, M. J. (2019). Using simulation studies to evaluate statistical methods. *Statistics in medicine*.
Mukherjee, T., Rahaman, M., Ghosh, A., & Bose, S. (2019). Optimization of adsorbent derived from non-biodegradable waste employing response surface methodology toward the removal of dye solutions. *International Journal of Environmental Science and Technology*, 1-8.
Nardi, P. M. (2018). *Doing survey research: A guide to quantitative methods*. Routledge.
Nicholas, J. M., & Steyn, H. (2017). *Project management for engineering, business and technology*. Routledge.

Nkansah, E., Dafor, N. K., & Essel-Gaisey, F. (2015). Willingness to pay for improved solid waste disposal in Tema metropolis. *UDS International Journal of Development*, *2*(1), 116-127.
Nnaji, C. C. (2015). Status of municipal solid waste generation and disposal in Nigeria. *Management of environmental quality: an international journal*, *26*(1), 53-71.

Obirih-Opareh, N., & Post, J. (2002). Quality assessment of public and private modes of solid waste collection in Accra, Ghana. *Habitat International*, *26*(1), 95-112.

Oduro-Appiah, K., Afful, A., Kotey, V., & de Vries, N. (2019). Working with the Informal Service Chain as a Locally Appropriate Strategy for Sustainable Modernization of Municipal Solid Waste Management Systems in Lower-Middle Income Cities: Lessons from Accra, Ghana. *Resources*, *8*(1), 12.
Oduro-Kwarteng, S., & Dijk, M. P. V. (2017). Regulatory environment for private sector involvement in solid waste collection in Ghana. *International Journal of Environment and Waste Management*, *20*(1), 35-48.
Ofori, P. A., Twumasi-Ampofo, K., Danquah, J. A., Osei-Tutu, E., & Osei-Tutu, S. (2017). Investigating Challenges in Financing Contractors for Public Sector Projects in Ghana. *Journal of Building Construction and Planning Research*, *5*(02), 58.
Oteng-Ababio, M., Arguello, J. E. M., & Gabbay, O. (2013). Solid waste management in African cities: Sorting the facts from the fads in Accra, Ghana. *Habitat International*, *39*, 96-104.

Owusu-Sekyere, E., Amoah, S. T., & Wedam, E. A. (2017). Solid waste generation, planning, and projection in Wa, Ghana. *UDS International Journal of Development*, *4*(1), 46-63.
Padgett, D. K. (2016). *Qualitative methods in social work research* (Vol. 36). Sage Publications.
Padi, A., Addor, J., & Nunfam, V. F. (2015). An econometric model of factors influencing households' willingness to pay for improved solid waste management service within the Sekondi–Takoradi metropolis in the western region of Ghana. *Journal of Economics and Sustainable Development*, *6*(16).
Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2015). Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. *Administration and Policy in Mental Health and Mental Health Services Research*, *42*(5), 533-544.
Patrick, I. M. V., Okon, U. E., & Solomon, U. U. (2017). Households' willingness to pay for improved solid waste management in Uyo metropolis, Akwa Ibom State, Nigeria. *American Journal of Environmental Protection*, *5*(3), 68-72.
Peprah, C., Amponsah, O., & Oduro, C. (2019). A system view of smart mobility and its implications for Ghanaian cities. *Sustainable Cities and Society*, *44*, 739-747.
Petković, D. (2015). Adaptive neuro-fuzzy optimization of the net present value and internal rate of return of a wind farm project under wake effect.

Pinto, J. (2017). What is project finance?. *Investment Management and Financial Innovations*.

Pires, A., Martinho, G., Rodrigues, S., & Gomes, M. I. (2019). *Sustainable Solid Waste Collection and Management*. Springer International Publishing.
Porter, M. E., & Kramer, M. R. (2019). Creating shared value. In *Managing sustainable business* (pp. 323-346). Springer, Dordrecht.
Prüss-Üstün, A., & Neira, M. (2016). *Preventing disease through healthy environments: a global assessment of the burden of disease from environmental risks*. World Health Organization.

Prüss-Üstün, A., & Townend, W. K. (1999). *Safe management of wastes from health-care activities*. World Health Organization.
Psomas, E. L., & Jaca, C. (2016). The impact of total quality management on service company performance: evidence from Spain. *International Journal of Quality & Reliability Management*, *33*(3), 380-398.
Puopiel, F. (2010). *Solid waste management in Ghana: the case of Tamale Metropolitan Area* (Doctoral dissertation).
Rakodi, C. (2016). The urban challenge in Africa. In *Managing Urban Futures* (pp. 63-86). Routledge.
Rethel, L., & Hardie, I. (2017). 13 Bond markets. *Handbook of Globalisation and Development*, 218.

Rogoff, M. J., & Screve, F. (2019). *Waste-to-energy: technologies and project implementation*. Academic Press.
Saadeh, D., Al-Khatib, I. A., & Kontogianni, S. (2019). Public–private partnership in solid waste management sector in the West Bank of Palestine. *Environmental monitoring and assessment*, *191*(4), 243.
Salacuse, J. W. (2017). BIT by BIT: The growth of bilateral investment treaties and their impact on foreign investment in developing countries. In *Globalization and International Investment* (pp. 25-45). Routledge.

Salvaire, C. (2019). Recovering Sociology from the Trash Heap: Of Waste Politics and the Spatialization of Local Representation in Lagos. *International Journal of Urban and Regional Research*, *43*(2), 354-376.

Sekaran, U., & Bougie, R. (2016). *Research methods for business: A skill building approach*. John Wiley & Sons.

Sibanda, L. K., Obange, N., & Awuor, F. O. (2017, December). Challenges of solid waste management in Kisumu, Kenya. In *Urban Forum* (Vol. 28, No. 4, pp. 387-402). Springer Netherlands.

Simos, J., Naissem, F. B., Naissem, J., Sokona, F. M., de Dieu Konongo, J., Sani, A., ..&
Sornette, D. (2017). *Why stock markets crash: critical events in complex financial systems*. Princeton University Press.

Spoann, V., Fujiwara, T., Seng, B., Lay, C., & Yim, M. (2019). Assessment of Public–Private Partnership in Municipal Solid Waste Management in Phnom Penh, Cambodia. *Sustainability*, *11*(5), 1228.

Stowell, D. P. (2017). *Investment banks, hedge funds, and private equity*. Academic Press.

Suleman, D., Simon, M., & Agyapong, R. (2015). Residents' perceptions and attitudes towards urban solid waste management in the Berekum Municipality, Ghana. *Oguaa Journal of Social Sciences*, *7*(2), 25-37.

Sulemana, A., Donkor, E. A., Forkuo, E. K., & Oduro-Kwarteng, S. (2018). Optimal routing of solid waste collection trucks: a review of methods. *Journal of Engineering*, *2018*.
Taylan, O., Bafail, A. O., Abdulaal, R. M., & Kabli, M. R. (2014). Construction projects selection and risk assessment by fuzzy AHP and fuzzy TOPSIS methodologies. *Applied Soft Computing*, *17*, 105-116.

Thai, V. V. (2016). The impact of port service quality on customer satisfaction: The case of Singapore. *Maritime Economics & Logistics*, *18*(4), 458-475.
Thompson, I. A. (2010). Domestic waste management strategies in Accra, Ghana and other urban cities in tropical developing nations. *Cleveland: Case Western Reserve University*.

Tibu, C., Annang, T. Y., Solomon, N., & Yirenya-Tawiah, D. (2019). Effect of the composting process on physicochemical properties and concentration of heavy metals in market waste with additive materials in the Ga West Municipality, Ghana. *International Journal of Recycling of Organic Waste in Agriculture*, 1-11.
Tompkins, R. (2019). "The Waste of Society as Seen through Women's Eyes:": waste, gender, and national belonging in Japan.

Turner, J. R. (2014). *Handbook of project-based management* (Vol. 92). New York, NY: McGraw-hill.
Turner, R. (2016). *Gower handbook of project management*. Routledge.
Ugwu, E. I., Ekeleme, A. C., Awoyera, P. O., Ozioko, H. O., & Osinachi, U. (2018). Effect of municipal solid waste contamination on some geotechnical properties of soil. *Journal of Materials and Environmental Science*, *9*(2), 585-590.
UK Essays. November 2018. Servqual: An analysis. [online]. Available from: https://www.ukessays.com/essays/marketing/servqual-or-rater-is-a-service-quality-framework-marketing-essay.php?vref=1 [Accessed 20 April 2019].

Van de Klundert, A., & Lardinois, I. (1995, April). Community and private (formal and informal) sector involvement in municipal solid waste management in developing countries. In *Background paper for the UMP workshop in Ittingen* (pp. 10-12).

Van, D. P., Fujiwara, T., Tho, B. L., Toan, P. P. S., & Minh, G. H. (2019). A review of anaerobic digestion systems for biodegradable waste: Configurations, operating parameters, and current trends. *Environmental Engineering Research*. Waste Management, Volume 71, 2018
Waste, F. H. (2018). Hazardous waste management.
Wattanakamolchai, S., Singal, M., & Murrmann, S. K. (2016). Socially responsible customers and the evaluation of service quality. *Journal of Hospitality & Tourism Research*, *40*(6), 715-738.
Weber, B., Alfen, H. W., & Staub-Bisang, M. (2016). *Infrastructure as an asset class: investment strategy, sustainability, project finance and PPP*. John wiley & sons.

White, R., Turpie, J., & Letley, G. L. (2017). *Greening Africa's Cities: Enhancing the Relationship between Urbanization, Environmental Assets, and Ecosystem Services*. World Bank.

Williams, T. (2017). The nature of risk in complex projects. *Project Management Journal*, *48*(4), 55-66.
World Bank, Solid WasteManagement, September 20 2018.

Wu, X., House, R. S., & Peri, R. (2016). Public-private partnerships (PPPs) in water and sanitation in India: lessons from China. *Water Policy*, wp2016010.

Yeo, G. T., Thai, V. V., & Roh, S. Y. (2015). An analysis of port service quality and customer satisfaction: The case of Korean container ports. *The Asian Journal of Shipping and Logistics*, *31*(4), 437-447.
Yescombe, E. R. (2018). Public-Private Partnerships in Sub-Saharan Africa: Case Studies for Policymakers 2017.
Yin, R. K. (2017). *Case study research and applications: Design and methods*. Sage publications.
Yu, P. S., Chen, Z. Z., & Sun, J. (2018). Innovative Financing: An Empirical Study on Public–Private Partnership Securitisation in China. *Australian Economic Papers*, *57*(3), 394-425.