

Source of Funding for Accra Sewage Systems, the Lavender Hill Project

Prince Elisha Nsiah-Asamoah¹, Dr. David Ackah, PhD²

¹PhD. Student, Business University of Costa Rica

²President, Institute of Project Management Professionals

Email: nanayawghgh@yahoo.com | drackah@ipmp.edu.gh

Abstract

Sewerage fecal sludge waste management is an emerging issue in urban sanitation and is fast becoming an insurmountable challenge across Ghana, requiring urgent solutions and access to sewerage network. Rapid urbanization and migration to cities results to the inability of local districts assemblies to tackle it sewage systems and use of safety toilets at houses. In order to come up with viable solutions to this problem in Accra the capital of Ghana, Accra Sewerage Systems an Engineering Procurement Construction company initiated public-private partnership to construct the sewerage system at Korle lagoon popularly called "Lavender Hill" in Ghana. The Accra Metropolitan and Government of Ghana are the benefiteres of the project.

Therefore, this participatory research was undertaken to investigate the project financing of Accra Sewerage System, its operations and environments in which it was carried out, the budget model used by Jospong Group of Companies in collaboration with Government of Ghana under the Public Private Partnership sector operations. The target population was focused group participation of key stakeholders such as project managers, staffs of Accra Sewerage Systems and Accra Metropolitan Assembly and other stakeholders from various public and private institutions close to the project. Face to face, interviews for focused group and discussions were conducted between the researcher and a sample size of 200 respondents and data collected was analysed.

The research findings prove that the project sources of funding were from; Internal Generated Funds from the Jospong Group of Companies, Bank Loans, Equity financing from Owners and Grant from the government of Ghana and its development partners.

The data collected indicated that Accra Sewerage Systems Project was finance with a total cost of \$25,000,000 and \$500,000 cash inflows from Ghana Government for management and operational cost. It was therefore necessary to look into the project viability and its payback period since Internal Generated Fund (IGF) from the Jospong Group and Bank Loans was the source of funding to the project. In analyzing the project viability and payback, it was therefore necessary to apply the project-financing model known as the Payback Period. Therefore with an initial investment of \$25,000,000 and \$500,000 cash inflows from Ghana per month: As against the payback period decision "accept the project only if it's payback period is less than the project performance duration". It therefore know that, an initial investment of \$25,000,000 will be paid within fifty (50) months as against the project performance duration. It is true that the Accra Sewage System Projects was a viable project with a payback period estimated to be approximately 8 years.

The findings of the study also reveals that the three major impact of the Accra Sewerage System Plant within the communities; the project have improved the living condition of the people, aquatic life, the project has stopped the nuisance of disposing raw faecal into the sea and the project has eliminated bad stench from the community. Furthermore, the respondents indicated that the social impacts of the plant have brought is an improved tourism business in the community and has help community members to be more responsible. The Plant treat human faecal wastes without any health or environmental impacts meeting environmental and regulations and standards for faecal management. **Keywords:** Project Financing, Funding Project, Lavender Hill, Accra Sewage Systems

1. INTRODUCTION

Financing projects in Ghana has been a challenging. The high cost of credit and limited access to finance are the main challenges facing project developers in the country. High cost of credit affects project operations, cost and profitability of projects, which have long gestation periods. Project developers who are not able to generate enough revenue from the operations of the project stand the risk of losing assets used as collaterals (Ofori, P. A., Twumasi-Ampofo, K., Danquah, J. A., Osei-Tutu, E., & Osei-Tutu, S. 2017; Danquah, J. K., Analoui, F., & Koomson, Y. E. D. 2018). Limited access to finance by project developers from various sources of funding can affect the financing of

projects. This is due to inadequately resourced financial institutions. In addition, poor macro-economic indicators also discourage the granting of credit for project development (Dansoh, A., Frimpong, S., & Oteng, D. 2017). Project financing involves financing capital-intensive projects on the basis of long-term cash flows, using a leveraged structure. Raising funds to undertake such capital-intensive projects is challenging due to the strict and changing requirements of capital providers. These challenges have resulted in high cost of borrowing capital from market, making raising project capital difficult. In the currently changing business environment, the use of various forms of debt and equity instruments to raise capital has been a critical factor in determining project performance and project costs (Lasa, Y. M., Ahmad, N., & Takim, R. 2015; Pinto, J. 2017; Yu, P. S., Chen, Z. Z., & Sun, J. 2018).

Public-Private Partnerships (PPPs) have enjoyed a global resurgence and have become icons of modern public administration (Hodge and Greve, 2009). In recent times, the rising infrastructural needs, coupled with budgetary constraints of governments, have caused policy makers to seek innovative ways of financing public infrastructure. Among the available options is the use of private sector finance and expertise in the provision of public infrastructure and services through public-private partnerships (Carbonara et al, 2015). Several researchers and industry practitioners, with slight variations (Cuttaree and Mandri-Perrott, 2011), have defined public-private partnerships (PPPs). According to FHWA (2004), a public private partnership is a “long term contractual agreement formed between public and private sector partners, who allow more private sector participation than is traditional. The agreements usually involve a government agency, contracting with a private company, to renovate, construct, operate, maintain or manage a facility or system”.

However, Brinkerhoff and Brinkerhoff (2011) argue that the function specific definition of public-private partnerships, which focuses on the provision of infrastructure financing, construction, operation and maintenance, limits its scope. They suggest that a mutual commitment between the public entity and the private organization is the key. The features of a public private partnership are the allocation and sharing of risk among the parties (Ke et al, 2010), the long-term partnership (Middleton, 2000) and availability of resources (Akintoye et al, 2003). The government of Ghana, faced with monumental infrastructural development needs and public service delivery challenges, adopted the use of Public-Private Partnerships (PPP), thereby freeing government resources for other equally important purposes. In furtherance of this policy stance, the Government of Ghana, through the Ministry of Finance (MOF), developed a national Public-Private Partnership Policy. This policy covered all sectors and levels of Government Metropolitan, Municipal and District Assemblies (MMDAs) Ministries, Departments and Agencies (MDAs) and sector specific needs.

The public private partnership ideology has been used in Ghana over the past two decades, with the participation of the private sector in developmental projects. However, the government adopted PPP as a national policy in 2004 when the National Public-Private Partnerships Policy Guideline was launched (MOFEP, 2011). Due to insufficient technical expertise and weak institutional structures (Osei-Kyei and Chan, 2016), the policy was revitalized in 2011 by the Ministry of Finance, through the establishment of the Public Investment Division of the ministry. With the support of the World Bank, the PPP policy was enacted into law, to facilitate the implementation of the PPP policy. The PPP law was expected to provide a sound and sustainable way of improving PPP preparation, procurement and management. The absence of clear government policy guidelines and procedures, immature financial markets, unstable economic conditions, misallocation and incomplete transfer of risks and high participation and transaction costs are the main challenges facing PPP in the country (Chan et al, 2010; Ismail & Haris, 2014; Osei-Kyei & Chan, 2015).

Public-Private Partnership arrangements in Ghana are guided by principles that ensure cost efficiency and service quality. The guiding principles are value for money, risk allocation, ability to pay, local content and technology transfer, safeguarding public interest and consumer rights, environmental, climate and social safeguards, clear objectives and output requirements, accountability, transparency, competition, contracting authority, ownership and commitment and stakeholder consultation (Yescombe, E. R. 2018). Public-Private Partnerships offer many benefits to citizens. Public-Private Partnership initiatives provide better solutions in infrastructure, compared with wholly public or wholly private initiatives. Furthermore, they result in faster project completion, thus reducing delays in infrastructural projects. In addition, returns on public-private partnership investments are higher than projects with traditional wholly private or government commitments (Delmon, J. 2017; Warner, M., & Sullivan, R. Eds. 2017; Leigland, J. 2018). Also, risks are appraised to determine the feasibility of the projects.

Apart from the above, public-private partnerships transfer operational and project execution risks from the government to the private participant that is more experienced. Besides, they allow the government they allow the government to redirect funds to other socioeconomic activities. Whilst public-private partnerships have a number of benefits, they are also saddled with shortfalls. Public private partnerships expose the private participant to risks that increase the cost of the projects to the government. In addition, the nature of public private partnerships makes them

accessible to a limited number of private entities, which have the capacity to complete the project. Finally, governments are disadvantaged which the public private partnership arrangement heavily relies on the private partner (Grimsey, D., & Lewis, M. K. 2005; Grimsey, D., & Lewis, M. K. 2017; Odoemena, A. T., & Horita, M. 2018).

2. LITERATURE REVIEW

2.1 Nuisance Called Lavender Hill

On a weekday, the half-mile stretch of road from some of Accra's most important landmarks – the Korlebu hospital road, the Bukum Sports complex, the James Town and Usher Forts, the Lighthouse, and James Town Mantse's Palace – and runs westwards over the Korle Lagoon, gets very busy with vehicular traffic carrying people and goods to the KorleGonno community and beyond. Korle Gonno, a town within Accra, is predominantly occupied by Gas. The major occupation of the people here is fishing; and the town has been growing rapidly into one of the city's bustling suburbs, with its share of residential and commercial properties, hotels, lorry parks, markets, drinking spots and schools. Ghana's premier health facility, the Korle-Bu Teaching Hospital is located nearby.



Fig 4: An Aerial view of James Town and KorleGonno, Two Communities Located close to Lavender Hill

It was a hot Friday afternoon, about halfway on this busy road; three trucks from various parts of the Greater Accra Region were all emptying their 'bellies' into the Atlantic Ocean. This is Lavender Hill. The name, Lavender Hill, transcends the borders of Ghana, along with all the negative publicity it carries including one in the United Nations Environmental Programme (UNEP) report, which indicated that at least three cesspit trucks dump untreated faecal waste at Lavender Hill every three minutes. From afar, watching how people go about their daily business, one may be tempted to believe that the indigenes of KorleGonno have become accustomed to the stench; but Mr. Jonathan Mensah- World Bank Water and Sanitation Consultant on projects says, that is far from the truth. "The smell has been a major bother to all of us, including students of the nearby Roman Catholic Boys Primary and Junior High School", St. Mary's Senior High School and the community at large. School pupils could sometimes not contain the stench, and the possibility of their running away before school closes is high.



Fig 5: Three Cesspit Trucks Discharging Untreated Human Faecal Sludge Directly into the Ocean.

2.2 The History of Lavender Hill

The story of liquid waste management in Accra would be incomplete without the name "Lavender Hill". Yet not many people know its history. The story of Lavender Hill cannot be found in books. It is on the lips of some of those who have been involved in the management of the country's water and sewerage systems. The initial

enthusiasm to write the history of Lavender Hill soon gave way to distress when institutions and organisations which were expected to readily provide documents or files on the oldest liquid waste facility in Accra were found wanting. Verbal accounts from the Coordinating Director of the Accra Metropolitan Assembly (AMA), Mr. Sam Aryeh Dartey, indicated that the discharge of liquid waste at Lavender Hill started as far back as 1908. Land for the facility, according to him, was leased to the then Accra Town Council, now Accra Metropolitan Assembly (AMA), in 1908 to be used for liquid waste management for the city of Accra. "It was built by the Accra Municipal Council and we have been using it ever since". In 2011, however, we had to take steps to shut it down", Mr. Aryeh Dartey stated. Another statement from Mr. Joseph Otoo, who worked as the Publicity Officer for the then Accra - Tema City Council in 1982 said Lavender Hill was constructed in 1928. "At that time, the liquid waste was treated and only the effluent flowed through a pipe into the sea".

Similarly, a former Public Relations Officer of the AMA, Mr. Eliot Adom said, "Lavender Hill was supposed to be an engineered plant, so that only the effluent of treated liquid waste would be discharged into the sea". According to him, Lavender Hill is about 90 years. "The name Lavender Hill has been used since the colonial era. It was the indigenes that named it 'Lavender Hill' because of the smell". Before Ghana's independence, and even long after, 'night soil' collectors emptied pan latrines and carried the waste to central collection points from which it was conveyed and dumped into any of the two chambers (cesspool) constructed at Lavender Hill. Mr. Adom said Accra's population was commensurate with the size of Lavender Hill in the 1980s. However, population increase placed enormous pressure on the facility, to the extent another liquid waste treatment plant had to be constructed at Achimota. "With increase in population, the Achimota plant broke down, and liquid waste from those areas and beyond then found its way to Lavender Hill. So that facility also gave way; and that is how it happened that there is now being discharged without treatment into the sea", Mr. Adom said. In a 1958 document 'Accra-A Plan or The Town', the Minister of Housing stated "The present methods to cope with disposal of human waste matter are the use of septic tanks and cesspit, and by bucket collection. The first two methods require periodic emptying of the tanks; and the last, daily collections. In all methods the waste is conveyed to an outfall at Korle Gonno where it is discharged, untreated, into the sea".

Today the number of trucks that empty their bellies into the ocean has soared rapidly, as the operations, hitherto limited to the Accra Metropolis, have expanded to include virtually all of the Greater Accra Region and Kasoa, in the Central Region. Statistics from the Greater Accra Liquid Waste Association (GALWA) indicate that as many as 400 cesspit operators discharge liquid waste into the ocean daily at peak periods. According to the leader of the association, Mr. Daniel Lamptey, cesspit trucks from all over the Greater Accra Region, Winneba and Kasoa in the Central Region access the broken down facility daily.

2.3 Lavender Hill at Ghana's Independence

The immediate post-independence era, 1957 - 1965 was a unique period of Ghana's economic history. Political independence from British colonial rule in 1957 brought great expectations for the future of the nation. In this context, bringing water and sanitation infrastructure into the cities was perceived as part of a modernization process in building a new and proud nation, "Ghana - the black star of Africa". In 1969, the International Development Association (IDA), approved a loan of US \$ 3.5 million to the Government of Ghana to finance the implementation of a project named the "Accra/Tema water supply and sewerage project". A second credit of US\$ 10.4 million was extended in 1974. With the approval of the loan, the Ghana Water and Sewerage Corporation (GWSC) established in 1966, entered upon the first World Bank financed project in the urban Water Supply and Sanitation (WSS) sector. The Accra/Tema water supply and sewerage project included the extension of the water distribution systems with connections in Accra and Tema. It also included the installation of water meters and a central sewerage system for Accra, with disposal into the ocean at Lavender Hill.

As Accra, at the time, was dependent on septic tanks and night soil collection systems, the sewerage part of the project constituted the first effort at providing a central sewerage system for the capital city. Repeated coup d'états, with governments changing between civilian and military rule, unstable economic conditions and debt crises, followed by a turn around to structural adjustment in the beginning of the 1980's, did not provide a predictable environment for the planning and development of a large scale and capital intensive water and sanitation infrastructure in the country. A steady decline in the country's GDP during this period also affected the deterioration of WSS infrastructure. At the beginning of 1990, a number of new laws and regulations were passed, and responsibilities were transferred from the centralised GWSC to other agencies. Responsibility for rural water and sanitation was hived off from the central organisation in 1998 with the establishment of the Community Water and Sanitation Agency as an independent body under the Ministry of Local Government and Rural Development. It was recognised that the district assemblies already

had waste management departments, and therefore, it was convenient to include sewerage in other sanitary duties at the local level “in order to enable effective coordination with other environmental sanitation activities”.

However, the country’s decentralization drive was weakened by the lack of funds and human resources to adequately carry out its mandate. In addition, as no platform was established for co-management of water and sewerage, the old argument that water and sewerage required joint planning did not seem to hold. Moreover, the Environmental Sanitation Policy of 1999 recognized that sewerage systems on city-wide scale were very capital intensive and were no longer promoted as vigorously as they had been during the immediate post-independence era. District assemblies, such as the Accra Metropolitan Assembly (AMA), took charge of storm water drainage, sanitary sewerage and other environmental sanitation functions in 1999. That same year, GWSC was converted into a wholly state-owned limited liability company, the Ghana Water Company Ltd, (GWCL) to concentrate on one core business – the supply of water to Ghana’s urban residents.

To a large extent, the Government remained committed to high standard solutions, such as in-house connections and underground water borne sewerage. The official goal was to phase out night soil collection in pans and other low standard types of human waste disposal. However, the sewerage aspect of the erstwhile corporation’s work was never fully developed. The only sewerage system it undertook, financed with a World Bank credit, was started in 1969 and was completed in 1973. It was limited to a small part of the city centre in Accra. Meanwhile, the pan latrine system, deemed inappropriate and unhygienic by official authorities, persisted in the absence of other affordable solutions. In 1999, the environmental sanitation policy city-wide sewerage systems were less vigorously promoted due to the high cost of such systems. Even when sanitation and sewerage had been discussed as part of official policy, the practical responsibility for carrying out the work was under-prioritized. Central sewerage is very limited in Ghana. The International Water Management Institute observed that all officially registered sewage the population disposed of entered into a sewerage system. However, the wastewater that passed through the sewer network, most of it remained untreated, due to the failure of the treatment plants. A survey carried out by the Ghana Statistical Service in 2002 showed that about 38% of the population disposed of their liquid waste directly onto the streets or outside; 21 % threw their wastewater into street gutters; another 35 %, on their compound; and 1%, in other places.

2.4 Away With ‘Lavender Hill’

The practice of discharging raw sewage into the Atlantic Ocean at Korle Gonno, which had persisted for nearly 110 years, has now ended. Today, the old Lavender Hill has been decommissioned. In its place is the New Lavender Hill Faecal Treatment Plant. The New Lavender Hill is located at Mudor, a little distance from the old one. Unlike the old one, the New Lavender Hill is environmentally sustainable and meets both local and international standards of operation. It is refreshing to have a modern faecal treatment plant that serves both the needs of the population and the environment.

2.5 The New ‘Lavender Hill Faecal Treatment Plant’

Nanjing Wonders Environmental Protection Company Limited, a Chinese construction firm working for Sewerage Systems Ghana Limited, a public-private partnership, constructed the new plant. The objective of the new Lavender Hill treatment plant is to give Ghanaians a more decent and environmentally acceptable standard facility. A consultant to the World Bank who specialises in water and sanitation issues, Mr. Harold Esseku, described the old Lavender Hill as “an environmental disaster”. Construction of the project began on 9th September, 2014. Cow dung is used to charge the system, since in the biological process microbes have to be cultivated to feed on the microorganisms in the septic tank to break down the faeces. The designed maximum treatment capacity is 2,400 m³/day. The Mudor treatment plant occupies a land area of 7.5 acres. It comprises a block of offices which also houses a well-equipped laboratory, Grid Screening machines, a 5,500m³ storage tank, a machine for odour control, and an Up-flow Anaerobic Sludge Blanket (UASB) comprising four tanks with capacities of 1,700m³ each where biological treatment takes place. Biogas, which comprises methane, carbon dioxide and hydrogen sulphide, is extracted from the UASB treatment process, after which it is cleaned for methane to generate electricity, mainly to run the plant. The gas is cleaned in three off-white sulphurisation tanks, and the expected volume of gas to be generated is about 7,000m³, which is expected to produce between 400kw to 500kw of electricity.

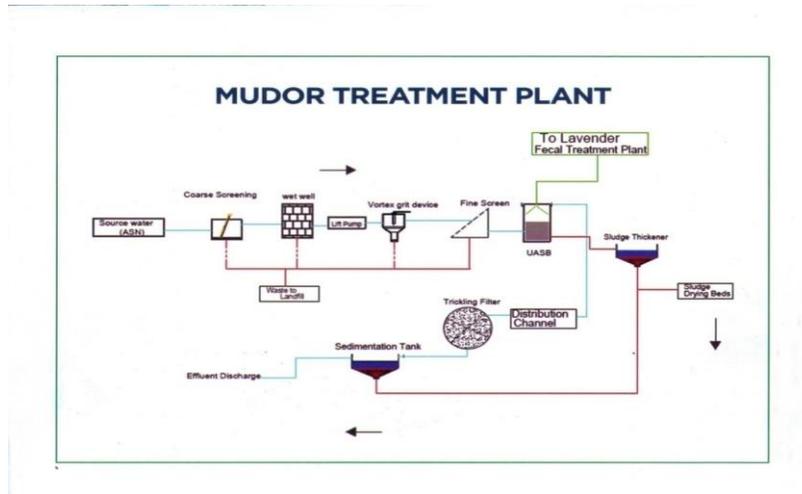


Fig 6: The Mudor Treatment Plant



Fig 7: The Rehabilitated Mudor Plant, Which Will Help In Liquid Waste Management for Accra

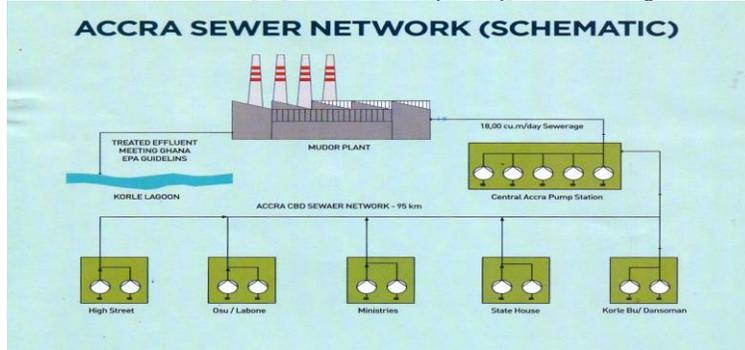


Fig 8: Accra Sewer Network

Effluent from the treatment process would also pass through an ultraviolet (UV) system before storage in two huge concrete clear water tanks, which hold the treated water that would be released into the sea or lagoon after being certified as meeting acceptable standards. The globally accepted level of Biological Oxygen Demand (BOD) in wastewater is below 50mg/l, and for Chemical Oxygen Demand (COD), below 120mg/l. Research has shown that the BOD in the Korle Lagoon is over 3265mg/l, due to excessive pollution. “When BOD is too high it indicates that dissolved oxygen (DO) is being consumed by bacteria present in the waste-water. This is an indicator of pollution in water, making it harmful to the environment. It means it cannot support plant life or be used for irrigation. The situation also reduces oxygen in the water and kills other living organisms in the water” (Liu, S. X. 2017).

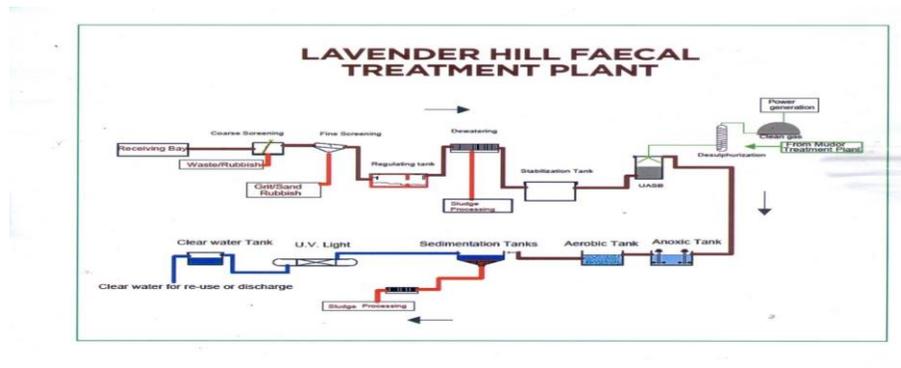


Fig 9: Lavender Hill Faecal Treatment Plant

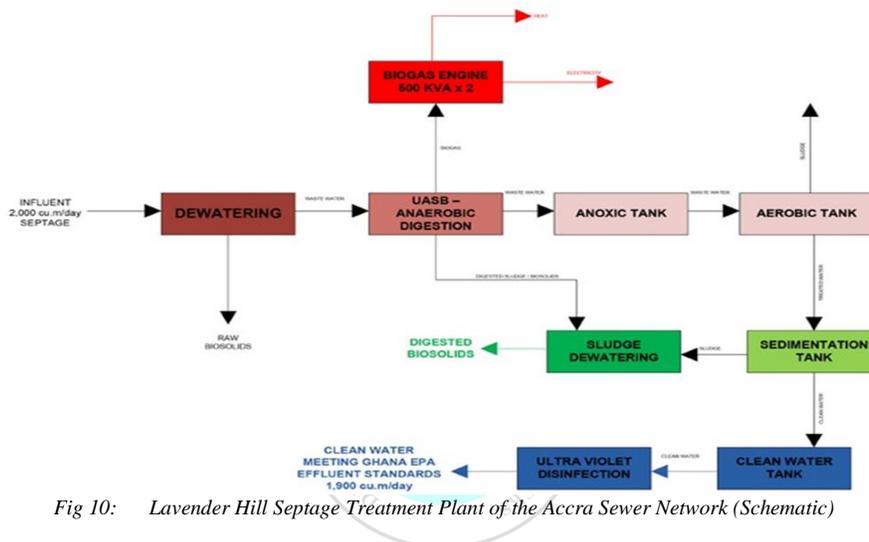


Fig 10: Lavender Hill Septage Treatment Plant of the Accra Sewer Network (Schematic)

Metropolitan and municipal assemblies are faced with challenges in handling district human faecal matter. This is not limited to Ghana. Other African countries are in similar situations. Handling sewage or liquid waste has been a major challenge to many Africa countries. In the developed countries, liquid waste and faecal waste systems are planned properly, and the waste is finally treated without any harmful environmental effects. The metropolitan assemblies produce large quantities of sewage that require proper and environmentally accepted methods of disposal. Accra, the capital of Ghana, was no exception in the struggle to manage faecal waste until the recent construction of a sewerage treatment plant in Ghana by Sewerage System Ghana Limited. The treatment plant serves all the Metropolitan and Municipal assemblies in the Greater Accra Region, as well as some parts of the Central and Eastern Regions of Ghana. Until the building of the Accra Sewerage System's treatment plant, faecal sludge was disposed off directly into the sea, as shown in figure 2. Sewage Sludge management is a challenging issue for most countries, especially in Africa.



Fig 2: A CESSPIT TRUCK DISCHARGING UNTREATED FAECAL WASTE DIRECTLY INTO THE SEA, AT KORLE GONNO THOUGH IN AN OPEN SPACE



Fig 3: TRUCK ATTENDANT WITH NO SAFETY BOOTS AND GLOVES WATCHING TILL THE FAECAL SLUDGE IS EMPTIED FROM THE CESSPIT TRUCK

2.6 Sewage

Sewage is a waste material characterized by its physical, chemical and biological composition. It comes from a community of people through domestic or municipal waste-water. Sewage waste-water produced in the community is characterized by its volume or rate of flow, physical condition, chemical and toxic constituents, and its bacteriologic status. It consists mostly of grey or black water, soaps, detergents and toilet paper (Marrone, P. A., Elliott, D. C., Billing, J. M., Hallen, R. T., Hart, T. R., Kadota, P., & Schmidt, A. J. 2018). The sewage waste material moves through a sewer from a residence or an industrial workplace to be dumped or converted to a non-toxic form. Sewage is mainly 99% water, the remaining material being solid, organic and inorganic chemicals, ions and harmful bacteria (Jinadasa, K. B. S. N., Meetiayoda, T. A. O. K., & Ng, W. J. 2018). The organic constituents are carbohydrates, fats, oils, grease, proteins and surfactants. The inorganic constituents are pH, chlorides, phosphorus, sulfur, gases, hydrogen, methane gases and oxygen (Hounslow, A. 2018; Marrone, P. A., Elliott, D. C., Billing, J. M., Hallen, R. T., Hart, T. R., Kadota, P., ... & Schmidt, A. J. 2018).

2.7 Sewage Treatment

Sewage treatment is the process of removing contaminants from waste-water and household sewage, including effluents and domestic sewage. The process includes physical, chemical and biological processes to remove contaminants (Blum, K. M., Andersson, P. L., Renman, G., Ahrens, L., Gros, M., Wiberg, K., & Haglund, P. 2017; Von Sperling, M., & de Lemos Chernicharo, C. A. 2017). The objective is to produce a treated effluent and a solid sludge, suitable for discharge or reuse for gardening, car washing, cleaning and other environmental activities. The water can only be used for such purposes after it has been treated (Yang, Y., Ok, Y. S., Kim, K. H., Kwon, E. E., & Tsang, Y. F. 2017). Sewage sludge is the residue generated from treatment of waste-water. This results in two types of sludge, namely primary and secondary sludge. Primary sludge emanates from the materials from the storage tanks used in the Waste-water Treatment Plants (WWTPs). The secondary sludge or the biological sludge is the sludge generated from the biological treatment of the waste-water drained from the settling tanks (Kim, M., Chowdhury, M. M. I., Nakhla, G., & Keleman, M. 2017; Droste, R. L., & Gehr, R. L. 2018). Chemical sludge is the residual sludge

produced with the aid of chemicals. The chemicals are used to facilitate the precipitation of hard or solid substances remaining, to improve suspended or remaining solid materials from the faecal (Von Sperling, M. 2017; Schaidler, L. A., Rodgers, K. M., & Rudel, R. A. 2017; Narayan, M., Solanki, P., & Srivastava, R. K. 2018; Perkins, R. J. 2018).

2.8 Waste-Water

Waste-water is any water or liquid adversely or loosely affected in quality by anthropogenic influence. This includes all liquid waste discharged by domestic residences, commercial properties, industries, rainwater and farms. It could also refer to the waste generated from the municipal waste through contamination and spillage (Liu, S. X. 2017; Droste, R. L., & Gehr, R. L. 2018). In general terms, sewage or waste-water is mostly polluted water which contains organic and inorganic substances, industrial waste, hospital waste, ground-water waste, flowing rivers and all contaminated water (Qasim, S. R. 2017; Wang, Q., Wei, W., Gong, Y., Yu, Q., Li, Q., Sun, J., & Yuan, Z. 2017). Waste-water from domestic and industrial sources is generated throughout the year. This is common in almost every continent where more than 10,000 metric tons of organic waste are deposited in a year. These organic compounds are handled properly and removed to prevent exposure, thereby causing environmental problems. Otherwise, this could affect the economy of every nation, as outbreak of diseases and illnesses reduces productivity and lowers performance in nation building. A huge sum of money is needed to mitigate risks and outbreak of such disease. In Ghana, for instance, the Environmental Protection Agency (EPA) regulates, maintains and controls all industries so they could treat the waste-water emanating from their plants before discharge. Unfortunately, this cannot be done for all domestic dwellings or homes. Hence the need for national sewage plants to prevent outbreaks of diseases and recycle of waste-water (Liu, S. X. 2017; Droste, R. L., & Gehr, R. L. 2018).

3. ANALYSIS OF RESEARCH ISSUES

3.1 What was the Financial Model used in Financing Accra Sewerage Systems?

The main purpose of the question was to get the financial models on how the project was financed and to provide guidance on the sources of financing project, implementation and maintenance of Sewerage Systems in Accra. Funding models are not universal as the implementation environment of cities and town's Sewerage System infrastructure may differ, thus requiring adjustment to the models. From the responses given, there was not much significant difference between the responses that were reported from the participants on the financial model used in financing Accra Sewerage Systems. While some reported that, they use monies from the internally generated funds, bank loans and grants from local donors. Others also reported that they should use debt financing, central government financing, bank loan and equity financing. The responses were quoted below:

- It depends; we used debt financing, equity financing and few times central bank to finance the projects with an advance mobilization grant. Nevertheless, the Josphong Group used its resources to finance most of the project. *(FM1)*
- Well, we had mobilization grants from the client (in this case government as part payment). Sometimes in addition, we do equity financing of our projects. *(HOD)*
- Our bankers have always helped us to mobilize to go to the site and start the work. What happens is that, anytime we get the project, we contact our bankers and then they work out some small money to start. Sometimes, we use some of our internally granted funds to start the projects and we receive grants from our local donors to start the project. *(FM2)*
- The good projects give us mobilization grants. We try to find any public private partnership from anywhere. *(M) and (DP)*
- Ok, our Bankers have always advanced an appreciable overdraft facility to most of the jobs we had started. *(FM2)*
- I would say that, we usually seek help from public private partnership to support our projects. *(PS) and (S)*
- Well, project facilitators are forced to raise the needed capital to start an awarded contract from their own funds that is by self-financing. *(SM) and (OCS)*
- Usually, we always rush to our bankers for loans so that we can go borrow money to start our projects. Sometimes, we self-finance our projects. *(HED) and (HOM)*

Almost all the participants suggested that the financial model used in financing Sewerage System project fall on the capital ability of the construction company. Unfortunately, almost all the participants alluded, to the fact the mobilization grants from government was made available to them from the central government.

3.2 Source Fund For Accra Sewage Systems Project

Out of the twenty (20) interview questionnaires that were disseminated to the focus group that was the staff of AMA and SSGL, it came out that, the project source of fund or financing model was: Internal Generated Fund¹, Bank Loans² and Grant from Local Donor or Development Partners³. The data collected indicated that Accra Sewage Systems Project was constructed at a total cost of \$25,000,000 and \$500,000 cash inflows from Ghana Government for management and operational cost. It is therefore necessary to look into its viability and its payback period of the project since Internal Generated Fund (IGF), and Bank Loans was source of funding to the project. Again, the participants were further asked to indicate the type of model they would have used for the project. The responses are quoted below:

- It depends, but most at times, we use the forecasting model to generate funds to support our sewerage system project.
- Usually, we rely on the discounted cash flow model and budget model in financing our sewage project.
- It can be concluded, from the participant's comments that they usually use the forecasting model and discounted cash flow.

The study supports the findings of Bilinski, Lyssimachou and Walker (2013), who concluded that most sewage project are finance using the forecasting and discounted model. This outcome is at complete variance to the study by Bonini, Zanetti, Bianchini and Salvi (2010), who concluded that most projects are finance using Merger model and Initial public offering model.

3.3 What is the Type of Contract used for Construction?

This section sought to find out the type of contract used in financing Accra sewage system projects. From the responses as given, there was not much significant difference between the responses expected as compared to question 1 on the type of contract used for financing and construction of Accra Sewerage Systems. While some reported that, the contracts are usually between them and the Ministry of Local Governments and Accra Metropolitan Assembly. Others also reported that they usually operate on open financier build and operate equipment and Public Private Partnership contracts. Others also reveal that they sign the turnkey contract. The responses are outline below:

- It depends; we have a sign management contract of Accra Sewerage Systems Ghana limited to support our financing. A contract sign between Accra Sewerage Systems Ghana and the Ministry of Local Governments and Accra Metropolitan Assembly. *(FM2) and (DP)*
- Well, we sign a contract to build and operate equipment supply (in this case with the central government). *(HOD)*
- We try to find contracts of Public Private Partnership from anywhere. Sometimes it is difficult but at least we are always successful so we cannot complain. *(M) and (DP)*
- I would say that, we usually seek help from Public Private Partnership to support our projects. We sometimes call them the Fixed Price Contracts. *(PS) and (S)*
- Usually, we rely on Procurement Engineering Contracts for Sewerage Systems Management. *(DP) and (M)*
- Ok, sometimes we depend on turnkey contract, Build Operate and Own (BOO). Where we build or construct the project with our own monies and transfer project back in some years. *(GM), (MD) and (SM)*

Almost all the participants suggested that there was a contract between them and the Ministry of Local Government and Accra Metropolitan Assembly. The outcome of this study agrees with the study done by Awuah and Yeboah (2010), who concluded that majority of the contracts are sign by the district Assemblies and the Central Government. Others also reported that they usually operate on open financier build and operate equipment and Public Private Partnership Contracts. Furthermore, the study supported the work of Algarni, Arditi and Polat (2007), who concluded that majority of the contract are based on build operate and transfer arrangement. In addition, some indicated the use of turnkey contract, where they build with their own funds and transfer project back in some years.

3.4 What is the Risk in financing such Project?

Again, amongst the participants there was a consensus that there are various risks involved in financing government projects. The views expressed are presented below: While the respondent explained that sometimes, there is lack of funds in the government coffers. The participants also described the risks to be inadequate government budget allocation. Nobody is interested in pre-financing project again. Because they fear, their capital would be lock up for so long. Now, it is difficult to get a loan approved for you to go back to site and work. Every financier wants his or her money at the agreed duration. Unfortunately, it is not the case in this situation; sometimes it could take up to two years before the lender gets their monies. So honestly, it is really affecting our ability to borrow money to do a project now in Ghana. *(DP) and (FM2)*

Due to central governments, numerous projects to attend to and all projects must be attended to financially, so usually there is a drain on the limited resource of the government. Hence, some of the projects suffer delayed payments. The delayed payments affect everything we do. The banks do not want to finance anything we take to them. The sad thing is that, by the time the money is paid, the interest on the overdraft facility would have balloon to an unmanageable debt portfolio. Now we are all working for the banks. *(M) and (FMI)*

Lack of proper planning of project before commencement periods by government, allocation of funds becomes very difficult when the entire project is not well analysed and implemented well. *(HOD) and (PS)*

Design changes and scope creep, numerous variations and additions to previous design and size of projects leads to payment delays, especially if the project drawings and specifications do not cover the details of those changes. *(HOP) and (SM)*

Change of government causes delayed in payments. In that when a new government is elected into power, some of the projects of the previous government are abandoned and may affect honoring of public project payments. Anytime there is a change of governments, projects stands a risk of not operating. *(DP), (FM2), (GM) and (ES)*

The participants indicated that most of the risks in financing projects are election of or change of government, insufficient planning before the project commence, public projects are too many and the central government is not able to fund all projects at the same time and design changes, variations and additions in the course of doing the project. This support Sornette (2017) findings that most projects suffer when there is change in government. However, the findings are inconsistent with Labys (2017) and Bascom (2016) who concluded that changes in raw materials and other construction tools prices are the major risk contractor's face in their work.

4. CONCLUSION

The research findings prove that the project sources of funding were from; Internal Generated Funds (IGF) from the Jospong Group of Companies, Bank Loans, Equity financing from Owners and Grant from the government of Ghana and its development partners.

The data collected indicated that Accra Sewerage Systems Project was finance with a total cost of \$25,000,000 and \$500,000 cash inflows from Ghana Government for management and operational cost. It was therefore necessary to look into the project viability and its payback period since Internal Generated Fund (IGF) from the Jospong Group and Bank Loans was the source of funding to the project.

In analyzing the project viability and payback, it was therefore necessary to apply the project-financing model known as the Payback Period. Therefore with an initial investment of \$25,000,000 and \$500,000 cash inflows from Ghana per month: As against the payback period decision "accept the project only if it's payback period is less than the project performance duration". It therefore knows that, an initial investment of \$25,000,000 will be pay within Fifty (50) months as against the project performance duration. It is true that the Accra Sewerage System Projects was a viable project.

From the findings, there were clear signs of some delays in payment. The delays in payment within the construction industry sometimes affect all stakeholders in the industry and everything including the Accra Sewerage

System operations and have to burrow for management and operational cost. The project was successfully completed on time and hence the company ability to deliver successful projects in other districts in Ghana.

Reference

1. A.G. Pervov, A.P. Andrianov, T.P. Gorbunova, A.S. Bagdasaryan, *Petr. Chem.*, 55(10), 879-886 (2015)
2. Gulshin, A. Kuzina, *IJAER*, 10, 21, 42618–42623 (2015)
3. E.S. Gogina, O.V. Yantsen, O.A. Ruzhitskaya, *AMM*, 580–583, 2354–2357 (2014)
4. Volkov, V. Chulkov, R. Kazaryan, M. Fachratov, O. Kyzina, R. Gazaryan, *AMM*, 580-583, 2281-2284, (2014)
5. A.G. Pervov, A.P. Andrianov, E.B. Yurchevskiy, *Petr. Chem.*, 55 (10), 871-878 (2015)
6. E. Gogina, A. Pelipenko, *MATECCONF*, 73, 03007 (2016)
7. V.N. Varapaev, S.A. Doroshenko, A.Y. Trotsko, A.V. Doroshenko, *IJAER*, 10, 21, 42588-42592 (2015)
8. O. Kuzina, E. Pankratov, V. Tkachev, *MATECCONF*, 86, 05023 (2016)
9. V. Orlov, A. Andrianov, *AMM*, 580–583, 2398-2402 (2014)
10. V.N. Varapaev, A.V. Doroshenko, I.Y. Lantsova, *Pr. Eng.*, 153, 816-823 (2016)
11. E.S. Gogina, O.A. Ruzhitskaya, O.V. Yantsen, *AMR*, 919–921, 2145–2148 (2014)
12. N. Makisha, *E3sconf*, 6, 01002 (2016)
13. A.G. Pervov, A.P. Andrianov, *DWT*, 35 (1-3), 2-9 (2011)
14. E. Gogina, I. Gulshin, *AMM*, 580-583, 2367-2369 (2014)
15. Volkov, O. Kuzina, *Pr. Eng.*, 153, 838-843 (2016)
16. N. Makisha, *Pr. Eng.*, 165, 1087-1091 (2016)
17. A.A. Volkov, A.V. Sedov, P.D. Chelyshkov, D.A. Lysenko, A.V. Doroshenko, *IJAER*, 10, 22, 43269-43272 (2015)
18. N. Makisha, *Pr. Eng.*, 165, 1092-1097 (2016)
19. E. Gogina, I. Gulshin, *Pr. Eng.*, 153, 189-194 (2016)
20. A.G. Pervov, A.P. Andrianov, V.A. Chukhin, R.V. Efremov, *IJAER*, 10, 22, 43517-43525 (2015)
1. Allen, F., and D. Gale. (1999). *Comparing Financial Systems*. MIT Press, Cambridge, MA.
2. Beale, C., M. Chatain, N. Fox, S. Bell, J. Berner, R. Preminger, and J. Prins. (2002). Credit Attributes of Project Finance. *The Journal of Structured and Project Finance*, 8(3), 5-9.
3. BIS. (2001). *Working Paper on the Internal Ratings-Based Approach to Specialised Lending Exposures*. BCBS Working Papers No 9, Bank of International Settlements.
4. Blanc-Brude, F., and R. Strange. (2007). How banks price loans to public private partnerships: Evidence from the European markets. *Journal of Applied Corporate Finance*, 19, 94-106. *Investment Management and Financial Innovations*, Volume 14, Issue 1, 2017

5. Bonetti, V., S. Caselli, and S. Gatti. (2010). Offtaking agreements and how they impact the cost of funding for project finance deals: A clinical case study of the Quezon Power Ltd Co. *Review of Financial Economics*, 19, 60-71.
6. Brealey, R., I. Cooper, and M. Habib. (1996). Using project finance to fund infrastructure investments, *Journal of Applied Corporate Finance*, 9, 25-38.
7. Buscaino, V., S. Caselli, F. Corielli, and S. Gatti. (2012). Project finance collateralised debt obligations: An empirical analysis of spread determinants. *European Financial Management*, 18, 950-969.
8. Carey, M., and G. Nini. (2007). Is the corporate loan market globally integrated? A pricing puzzle. *Journal of Finance*, 62, 2969-3007.
9. Caselli, S., and S. Gatti. (2005). *Structured Finance: Techniques, Products and Market*. Springer: Berlin.
10. Chakraborty, S., and T. Ray. (2006). Bank-based versus market-based financial systems: A growth-theoretic analysis. *Journal of Monetary Economics*, 53, 329-350.
11. Corielli, F., S. Gatti, and A. Steffanoni. (2010). Risk Shifting through Nonfinancial Contracts: Effects on Loan Spreads and Capital Structure of Project Finance Deals. *Journal of Money, Credit and Banking*, 42, 1295-1320.
12. Demirgüç -Kunt, A., and R. Levine. (1999). *Financial structures across countries: stylized facts*. Mimeograph, World Bank, Washington, DC.
13. Esty, Benjamin. (2003). *The Economic Motivations for Using Project Finance*. Boston: Harvard Business School publishing.
14. Esty, Benjamin. (2004a). *Modern Project Finance – A Casebook*. John Wiley & Sons, Inc.
15. Esty, Benjamin. (2004b). Why Study Large Projects? An Introduction to Research on Project Finance. *European Financial Management*, 10, 213-224.
16. Esty, B., and A. Sesia. (2007). *An Overview of Project Finance & Infrastructure Finance – 2006 Update*. Boston: Harvard Business School publishing.
17. Esty, B., and W. Megginson. (2003). Creditor rights, enforcement, and debt ownership structure: Evidence from the global syndicated loan market. *Journal of Financial and Quantitative Analysis*, 38, 37-59.