

Analyzing the Economic, Social, and Environmental Impact of the Lavender Hill Project, its Viability and Payback Period

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

Project finance is the long-term financing of economic infrastructure and industrial projects based upon the projected cash flows of the project rather than the balance sheets of the project sponsors. Projects can be financed with equity from one or more sponsoring firms and non-recourse debt for investing in a capital asset - to own and invest in the project. Equity and debt instruments such as shares, venture capital, institutional investors, bonds, loans and debentures serve as sources of funding for infrastructural and developmental projects. Other specialized sources for funding projects are grants, crowd funding and peer-to-peer funding. Project finance creates value by reducing the costs of funding, maintaining the sponsors financial flexibility, increasing the leverage ratios, avoiding risk, reducing corporate taxes, improving risk management, and reducing the costs associated with market imperfections. It involves non-recourse financing of the development and construction of a particular project in which lenders look to the revenue expected to be generated by the project for repayment of its loans and to the assets of the project as collateral for its loan rather than to the general credit of the project sponsor.

Project finance has its own challenges especially Public Private Partnership Projects. Public Private Partnership for developmental and social infrastructures involve the private sectors in the designing, building, financing and operating public infrastructure in institutional sectors such as power generation, transportation-roads, or railways, water supply, energy, hospitals, sanitation, waste management, affordable houses and schools. Public Private Partnerships (PPPs), project financing for public infrastructure, are now emerging as a viable source of infrastructure investment in developing countries. A successful PPP arrangement capitalizes on the strengths of the private and public sectors to provide a better and more cost-effective public service, and speed up the rate of its implementation or coverage. The growth in PPPs has been attributed to several reasons, including increased efficiency in project delivery and operation; reinforcing competition; access to advanced technology; and reducing government budgetary constraints by accessing private capital.

Keywords: Project Economic Impact, Payback Period, Project Viability, Project Performance Duration

1. INTRODUCTION

Project Financial Engineers are often asked to assess the benefits or damages from a past or future project on the economy of a country. Examples include assessment of regional economic consequences of alternative timber harvest levels, entry or exit of a manufacturing plant, or the construction or demise of an irrigation project. Analysts have increasingly turned to the tools of regional analysis, especially regional input-output (I-O) models, to estimate these benefits or damages. Regional I-O models are constructed to estimate linkages among sectors of the economy of a target region. In this way, an event affecting one sector can be traced through the regional economy, and the change in value added, income earned by primary factors of production, can be estimated. This approach allows estimation of both direct impacts caused by the initial change in the affected sector and secondary impacts which result as the direct spending works its way through the economy. Direct income impacts of a project are the factor payments: the wages, rents, and profits earned by input factors used directly by the project. Secondary impacts result when the directly affected sector buys inputs from other sectors (backward linkages) or produces outputs that become inputs for expansion of other regional industries (forward linkages). A new irrigation project will cause agriculture to buy more from backward linked fertilizer, machinery, and insurance sectors, and may allow expansion of forward-linked livestock and food-processing sectors. The directly affected sector, along with backward and forward linked sectors generate value added consisting of income earned by the input factors.

Sewerage Systems Ghana Limited (SSGL), a subsidiary of the Jospong Group of companies, is a limited liability company incorporated under laws of Ghana. It has been in existence since July 2012. It is an engineering, construction and procurement specialist company, focusing on the provision of efficient liquid waste sewerage

treatment. Since its establishment, Sewerage Systems Ghana Limited has built two new faecal treatment plants - Lavender Hill Faecal Treatment Plant near the Korle Lagoon and the Kotoku Faecal Treatment plant at Adjenkotoku. SSGL has also rehabilitated the Mudor Sewerage Treatment Plant at James Town -Korle Lagoon. Sewerage Systems Ghana Limited, sponsors of the Accra Faecal and Sewage Treatment plants, (Korle Lagoon Site) has the Government of Ghana being the main benefactor. The government being the benefactor is to finance for eight (8) years the management and operational cost, after the completion of the project. This project was presented to the Public Procurement Authority and the Parliament of Ghana for approval before its commencement. Both government entities approved of the construction of the project. The Accra Metropolitan Assembly (AMA), a major stakeholder and a beneficiary of the project, had to relocate the initial settler's or occupants of the land before the project commencement of the project. SSGL was seeking an initial loan financing agreement from the Standard Chartered Bank to pre-finance the project. However, the bank could not grant the loan. SSGL had to use financial resources from the mother company, the JOSPONG Group of Companies, and ZOOMLION Ghana Ltd as its equity contribution towards sponsoring and financing the project. This thesis seeks to investigate the project financing of the Accra Sewerage System, its operations and the environments in which it was carried out, and the budget model that was used by the Josping Group of Companies in this Public Private Partnership arrangement.

Ghana's economy has enjoyed a high rate of economic growth over the past decade, compared with other African Countries. Ghana is tipped to lead Africa as the fastest growing economy in 2018, with a growth rate of 8%, because of increased oil and gas production. This will boost the economy and increase infrastructural developments in the country, including domestic electricity production as well as exports revenue (Nagy, H., Káposzta, J., Neszmélyi, G. I., & Obozuwa, O. G. 2018; Parker, S. C. 2018). The change in growth is attributed to rising commodity prices, fuelled by expanding demand in the global economy (myjoyonlineJan16, 2018). In the bid to maintain continuing growth, Ghana has increased electricity provision, road construction, sanitation facilities and telecommunication networks (Pinz, A., Roudyani, N., & Thaler, J. 2018). Financing of infrastructural projects is not only from proceeds from natural resources and tax revenues, but also from private funding and international donor agencies (Owusu-Manu, D. G., Edwards, D. J., Kutin-Mensah, E. K., Kilby, A., Parn, E., & Love, P. E. 2017). The scarcity of financial resources for undertaking infrastructural projects by both the public and private sectors forms the basis for the advocacy by various sectors of the economy for efficient financial management and use of resources in project implementation (Ahmad, E., Bhattacharya, A., Vinella, A., & Xiao, K. 2018; Barr).

Project finance refers to the financing of long-term infrastructural projects and public services on the basis of a non-recourse or limited recourse financial structure. The project debt and equity used to finance the project are paid back from the cash flow generated by the project. It involves non-recourse financing of the development and construction of a particular project in which lenders look to the revenue expected. The revenue generated from the project is used to repay its loans; and the assets of the project rather than the general credit of the project sponsor are used as collateral for its loans (M. J., & McClellan, G. S. 2018; Humphreys, E., van der Kerk, A., & Fonseca, C. 2018). Project financing encompasses the legal work required for the development, the equity and non-recourse debt financing as well as the construction, operation and maintenance of major industrial infrastructural projects. These infrastructural projects include sewerage treatment plants, power plants, water plants, hydrocarbon processing and chemical plants, pipelines, transmission lines, toll roads, airports and other social developments needed in a country (Osei-Kyei, R., Chan, A. P., & Dansoh, A. 2017; Yescombe, E. R. (2017); Ameyaw, E. E., & Chan, A. P. 2015; Lambrecht, I. B., & Ragasa, C. 2018).

Project funding and project financial engineering have significant impact on the project cost, the cash flow and the success of the project. Few project managers have more than a rudimentary understanding of this important element of overall project management strategy (Larsen, J. K., Shen, G. Q., Lindhard, S. M., & Brunoe, T. D. 2015; Fleming, Q. W., & Koppelman, J. M. 2016; Kerzner, H., & Kerzner, H. R. 2017). It is important to recognize that the means an organization uses to finance its projects can have a huge impact on its ability to successfully control costs, manage its cash flow and maintain an acceptably positive degree of value for the project. Project managers who do not select a useful type of financial model for financing their investment projects can greatly compromise the ultimate worth of their projects (Larsen, J. K., Shen, G. Q., Lindhard, S. M., & Brunoe, T. D. 2015; Fleming, Q. W., & Koppelman, J. M. 2016; Kerzner, H., & Kerzner, H. R. 2017). Public private partnerships (PPP) are institutions that use public policies, regulations or financing to leverage private sector financing. The characteristics of PPPs for financing projects include: A contractual relationship between a public entity and a private organization¹, the allocation of risks between the public and private partners, consistent with their willingness and ability to mitigate risks, in order to encourage the private partner to mobilize financing², the mobilization of increased financing³, and payments to the private sector investor for delivering the services⁴

2. LITERATURE REVIEW

2.1 Project Financing

Project finance is the process of financing infrastructure and industrial projects based upon the projected cash flows of the project rather than the balance sheets of the project sponsors. It involves non-recourse financing of the development and construction of a particular project in which lenders look to the revenue expected to be generated by the project for repayment of its loans and to the assets of the project as collateral for its loan rather than to the general credit of the project sponsor. Other theories define project financing as the creation of a legally independent project company, financed with equity from one or more sponsoring firms and non-recourse debt for investing in a capital asset. The project company invests only in the particular project for which it is created and the project debt is structured without recourse to the sponsors (Nevitt and Fabozzi, 2000; Esty, 2004; Boardman, A. E., Greenberg, D. H., Vining, A. R., & Weimer, D. L. 2017; Delmon, J. 2017; Nicholas, J. M., & Steyn, H. 2017). The use of debt instruments such as bonds, loans and debentures serves as a source of funds for developmental projects (Lasa, Y. M., Takim, R., & Ahmad, N. 2018; Stowell, D. P. 2017). Equity instruments such as shares, and venture capital investors serve as sources of funding for infrastructural and developmental projects (Boardman, A. E., Greenberg, D. H., Vining, A. R., & Weimer, D. L. 2017). Other specialized sources for funding projects are grants and crowd funding (Hope, O. K., & Vyas, D. 2017). The economic criteria for appraisal comprise financial metrics decision making, the criteria for investment appraisal, such as the Net Present Value (NPV), the Internal Rate of Return (IRR), the Return on Investment (ROI), and the Payback Period (PP), (Pasqual et al., 2013). These financial metrics are tools used in appraising the economic viability of projects (Nicholas, J. M., & Steyn, H. (2017).

Payback period is the most common approach to project selection (Kivilä, J., Martinsuo, M., & Vuorinen, L. (2017). It considers how rapidly the project returns the initial investment in the project (Kerzner, H., & Kerzner, H. R. 2017). Although easy to understand, the payback method does not take into account the time value of money. The use of Net Present Value (NPV) in industry for project valuation is also commonplace (Wiesemann et al. 2010), and it is endorsed as a theoretically correct decision criterion in corporate financial theory (Brealey, Myers and Allen 2011; Berk and DeMarzo, 2011). It is the difference between the present value of cash inflows and cash out flows over the period. The Internal Rate of Return (IRR) is used in place or in conjunction with the Net Present Value (NPV) and other criteria such as the payback or residual income for investment evaluation (Magni, C. A. 2015). IRR is the interest rate at which the net present value of all cash flows from a project equals zero. It is the breakeven point of a project Net Present Value (NPV). The NPV and IRR are two of the most important criteria for choosing among investment projects (Padilla et al, 2013). In many circumstances, investment projects are ranked in the same order by both criteria –thus NPV and IRR. Li et al., (2013), considered NPV and IRR as indexes for evaluating the investment risk (Boardman, A. E., Greenberg, D. H., Vining, A. R., & Weimer, D. L. 2017). Sensitivity analyses of the Internal Rate of Return (IRR) in some economic situations provided some evidence. This is in support of the contention that the results of sensitivity analysis of Net Present Value (NPV) and Internal Rate of Return (IRR) may differ substantially (Percoco and Boronov, 2012). The general approach in determining to accept or reject decisions for a project via investment appraisal techniques, such as the NPV and the IRR, is to treat the cash flows as known with certainty (Bas, 2013; Petković, D. 2015; Gotze, U., Northcott, D., & Schuster, P. 2016).

Practically, project finance has two main types, Greenfield and brownfield. According to Ernst and Young (2015), “Greenfield project refers to an asset or structure that needs to be designed and constructed, where no infrastructure or building previously existed, and brownfield projects involve an existing asset or structure that requires improvement, repair or expansion”. Gardner & Wright (2012) point out that, generally, the execution of Greenfield projects should take 12 to 18 months to secure funding. A large proportion of equity investors refuse to invest in Greenfield projects. They prefer investment in operational brownfield projects. While investments in well-managed Greenfield projects can provide assets dynamics influence and high return on capital, the focus of Greenfield investors has been biased towards renewable energy and PPP projects (Marsh and McLennan, 2015).

2.2 Characteristic of Project Financing

Due to a number of reasons, project developers and project sponsors choose project financing. A typical project-financing model has certain features that can be identified with. The characteristics of project financing are;

- **Special Purpose Vehicle (SPV):** this is an entity created by a parent company to undertake specialized operations; and it is protected from the financial risk of the parent company. SPVs are created for purposes of risk sharing, protection against creditors and bankruptcy and securitization. SPVs provide the parent company with tax savings and isolated financial risk.

- **Limited Recourse (LR) or Non-Recourse (NR):** Projects with limited recourse prevent the lender from going after the assets of the borrower when the collateral asset used in securing the loan cannot fully pay off the indebtedness. Limited recourse facilities favour borrowers, whilst lenders prefer recourse loans.
- **The Leverage Project Finance (LPF)** always has an element of indebtedness. The huge initial capital required to start projects pushes project developers to source funds using either equity or debt. Project companies use more leverage when the project risk is high (Byoun et al; 2013)

2.3 Project Finance Life Cycle

The Project Life Cycle (PLC) is the process followed by all project managers in completing a project. It provides a framework for managing any type of project. The project life cycle is a standard procedure used by teams to achieve success on a project (Turner, J. R. 2014; Kerzner, H., & Kerzner, H. R. 2017). Project Finance Life Cycle (PFLC) is the process through which funds are solicited for the development of projects. It starts with fund sourcing where the project company identifies and solicits funding for the project (Kerzner, H. 2017). During this stage, the company considers the type of funding required and is available for the project. After sourcing for funds, the project company will prepare a proposal for the development of the project. The proposal will specify how the funds will be used to develop the project, the project costs and the expected revenue from the project (Leviton, B., Getz, K., Eisenstein, E. L., Goldberg, M., Harker, M., Hesterlee, S., & DiMasi, J., Kerzner, H. 2018). Accepted project proposals get the required funds. In providing the necessary funding, the investor will sign a contract with the project developer through loan agreements or other contractual agreements. Such agreements ensure that the projects terms and conditions of the loan agreement (Delmon, J. 2017; Salacuse, J. W. (2017). The projects are developed when funds are released from the investor or sponsor. The setting up of a project requires that the project is constructed by the project specifications under the project charter. After the completion of the project, it is managed to generate enough revenue to pay off the investors. The project is closed once all outstanding investor funds are paid, or as stipulated under the loan agreement.

2.4 Project Development Financing

Project financing is increasingly becoming complex in today's dynamic environment. A range of factors, such as geo-political, commercial, legal, environmental and social challenges, is consider in project development financing (Lasserre, P. 2017). In project development financing (PDF), the Project Finance Cycle (PFC) — from the initial structuring and project development to financing – is considered. Other issues such as joint ventures, project mergers, acquisitions, dispositions and project restructurings also affect project development financing. Project development involves planning, organizing, coordinating and controlling the project team from the sourcing of funds and initiation to the closing of the project (Heagney, J. 2016; Turner, R. 2016; Harrison, F., & Lock, D. 2017; Nicholas, J. M., & Steyn, H. 2017).

2.4.1 Advantages of Debt Financing: The use of debt as a source of financing provides a number of benefits as follows:

- Debt finance provides the borrower complete control and access to the business or project. The project sponsor does not have external interference from the lenders. This provides the borrower the ability to run the project and generate the required returns without external influence.
- The use of debt finance exempts the project sponsor from paying huge taxes. Loan repayments are classified as expenses, which are not taxable. This allows the funds saved to be used in developing the project.
- Debt financing provides low interest rates to borrowers compared with other sources of finance such as equity.
- The use of debt finance facilitates planning. The borrower knows well in advance the amount of principal and interest to pay at any point in time per the loan repayment schedule.

2.4.2 Disadvantages of Debt Financing: Although debt financing provides borrowers with benefits, it also has drawbacks.

- Debt financing requires borrowers to make loan repayments. The project developer therefore has to ensure that the project generates the required revenue to be able to service the loan. The inability of the project to generate the required revenue will affect the cash flow of the project.
- Defaults in making the agreed payments will affect the credit rating of the project. This will affect the ability of the project to secure future loans.
- The assets used by the borrower as collateral in the loan agreement can be lost to the lender in the event of default.

2.5 Project Impact

Very little is known about the actual impact of projects on the poor and community around the projects. Many are reluctant to carry out impact evaluations because they are deemed expensive, time consuming, and technically complex, and because the findings can be politically sensitive. Yet a rigorous evaluation can be powerful in assessing the appropriateness and effectiveness of programs. Evaluating impact is particularly critical in developing where resources are scarce and every dollar spent should aim to maximize its impact on poverty reduction. This handbook seeks to provide project managers and policy analysts with the tools needed for evaluating project impact. It is aimed at readers with a general knowledge of statistics. The relation between the environment and successful economic development is gaining global recognition.

The realization of the significance of predicting environmental impacts of development gave birth to environmental impact assessment (EIA), which is basically concerned with the identification and assessment of the environmental effects of development projects, plans, programmes and policies in order that an appropriate choice selection from presenting alternatives is made. EIAs have been mostly concerned with development projects, while a significant few have undergone implementation for land-use and sectoral plans and; in particular, the domestic policies from which these development activities generated. Identification and assessment of environmental development impacts are intricate because of the variants of impacts which may be caused by anthropogenic activities on environmental and social systems. To identify and assess these impacts necessitates collation of extensive data, and, most significantly, presenting, communicating or articulating the findings to decision makers and the public, most of whom lack the knowledge of the technicalities entailed. In order to surmount certain problems related to EIAs, attention is given to the development of structured aids or approaches to assessment, oftentimes referred to as EIA methodologies or methods.

3. RESEARCH ANALYSIS

3.1. What is the Environmental Impact of the Project?

This section sought to find out the environmental impact of the projects to the surrounding communities. From the responses given, there were not many differences in the responses that were reported from the participants. While some reported on provision of direct and indirect job acquisition, others also reported on the health benefits. Outbreaks of water-borne diseases, cholera, and malaria in the area are reduced after reconstruction of the sewerage project. The projects also improve the value of the land tenure system of the area. The responses are quoted below:

- Well, these projects provide direct and indirect jobs to the community members. Indirect jobs like food selling. In addition, the projects reduce the rate at which community members acquire diseases. *(M) and (FMI)*
- It depends, but most at times; these projects give or provide employment opportunities for the indigenous people in the community. *(HOD), (S), (PE), (ITO) and (SM)*
- Mostly, these projects help members of the community to get work to do and increase the wellbeing and the living standard of the members. *(M), (HOM) and (GM)*
- Well, the projects improved the health conditions of the people thereby decreasing the rate at which they get illness. Also, outbreaks of water-borne diseases, cholera and malaria infection in the area are reduced drastically. *(SM) and (OCS)*
- These projects increase the living conditions of the people in the community. The residents rate of visiting the nearby hospital decreases. *(FM2) and (ES)*

It conclude that the project provide direct and indirect job opportunities to members of the community. In addition, the project helps to reduce the rate of residents visiting the hospital because of good health they enjoy. Outbreaks of water-borne disease and malaria infection in the area are reduced. The findings are consistent with Awuah and Amankwa-Kuffour (2002) who concluded that the projects offer employment to members of the community. The community members were also ask to state the environmental impacts of the projects. The details of the responses are represented in Table.

Table: Environmental Impacts of the Project in the Community

Environmental impact	Frequency	Percent
Control water and soil pollution	14	7.0
Improved aquatic life living and reduced open disposal of faecal waste	21	10.5
Enjoy better hygienic environment and get employment opportunities	20	10.0
Improve health and reduction in outbreak of diseases	10	5.0
Improved the living condition of the people and aquatic life	44	22.0
Stopped the nuisance of disposing raw faecal into the sea	32	16.0
Improved sanitary conditions in the community	15	7.5
Public health conditions of the environment is protected	19	9.5
Eliminated bad stench from the community	25	12.5
Total	200	100

The findings in Table 6, reveals that 14 (7.0%) of the respondents indicated that the reconstruction of the projects in their community have controlled water and soil pollution. 21 (10.5%) stated that the project have improved aquatic life living and reduced open disposal of faecal waste in their community. Twenty - 20 (10.0%) also indicated that they enjoy better hygienic environment and get employment opportunities. Again, 10 (5.0%) of the respondents stated that the project in the community, have improve health condition, reduce outbreak of diseases, 44 (22.0%) of them reveal that the project have improved the living condition of the people and aquatic life and 32 (16.0%) of the respondents indicated that the project has stopped the nuisance of disposing raw faecal into the sea. Furthermore, 15 (7.5%) of the respondents reveals that the project has improved sanitary conditions in the community, 19 (9.5%) stated that the public health conditions of the environment is protected because of the project and 25 (12.5%) of them indicated that the project has eliminated bad stench from the community.

It concludes that the three major environmental impacts of the sewerage system project are that; the projects have improved the living condition of the people and 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.

3.2 What is the social impact of the project?

The abundance of poor sewage systems and its use as a weapon raises questions about community social cohesion. Poor sewage systems in a community are noted for their strong social cohesion. Achieving this through a social network, a process that tends to assist the poor to weather the storms and challenges associated with urban life. Interviews with the participants revealed the following: In particular, poor sewage systems are partly blamed, on lack of discipline among the citizenry with regard to lack of toilets at individual houses, their non-participation in the communal cleaning exercise and their indiscriminate dumping of refuse. Again, the respondents were also to indicate the social impact of the project and the details of their responses are represented in Table 7.

Table: Respondents View on the Social Impact of the Project

Social impact	Frequency	Percent
The community get social amenities such as water	39	19.5
Get employment opportunities and improve sanitation	14	7.0
Members get employment to improve their livelihood	21	10.5
The community are motivated to practice healthy lifestyle	46	23.0
Reduction in water-borne diseases	2	1.0
Elimination of open defecation	43	21.5
Improved tourism business in the community	12	6.0
Help to educate members to be more responsible	23	11.5

Total	200	100
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The results in Table 7 reveals that 39 (19.5%) of the respondents indicated that the community get social amenities such as water, 14 (7.0%) stated that the community members get work to do and get an improve sanitation environment and 21 (10.5%) also indicated that community members get employment to improve their livelihood. Again, 46 (23.0%) of the respondents stated that the projects motivate the community members to practice healthy lifestyle, 2 (1.0%) of them reveal that these projects have reduce water-borne diseases in the community and 43 (21.5%) of the respondents indicated that the project has eliminated open defecation in the area. Furthermore, 12 (6.0%) of the respondents reveals that the project has improved tourism business in the community and 23 (11.5%) stated that the projects going on in their community has help community members to be more responsible. The findings are consistent with Awuah and Amankwaa-Kuffour (2002) who concluded that the social impact members enjoy are improved healthy lifestyle of the people.

3.4 What is the Economic Impact of the Project on Neighboring Communities?

This question sought to establish the economic impact on the community members. Some indicators were used to collect data. The analysis of the data is presented in Table 8.

Table: Economic Impacts of the Projects on Neighboring Communities

Environmental impact	Frequency	Percent
Indigenous people get job and increase their business	44	22.0
Odour elimination and improved hygienic condition	10	5.0
Enjoy hygienic environment and employment opportunities	35	17.5
Improved living standards of members of the community	7	3.5
Provide employment opportunities for the youth	14	7.0
Decrease illness which eventually reduces cost	16	8.0
Improved tourism business in the community	17	8.5
Reduction of diseases and provision of jobs in the community	19	9.5
Reduced the outbreaks of water-borne diseases	28	14.0
Provision of more direct and indirect jobs in the community	10	5.0
Total	200	100

The results in Table 8 reveals that, 44 (22.0%) of the respondents indicated that the indigenous people had jobs during the project construction by the Sewerage Systems. 10 (5.0%) stated that the project have eliminated bad scents in their neighbourhood and improved hygienic condition and 35 (17.5%), also indicated that they enjoy hygienic environment and employment opportunities. Again, 7 (3.5%) of the respondents stated that the projects going on in their community have improved living standards of members of the community, 14 (7.5%) of them reveal that these projects have provided employment opportunities for the youth and 16 (8.0%) of the respondents indicated that the project has decrease illness which eventually reduces cost. Furthermore, 17 (8.5%) of the respondents reveals that the project has improved tourism business in the community, 19 (9.5%) stated that the projects going on in their community has reduce the rate at which they get diseases and provided jobs for individuals and 28 (14.0%) of them indicated that the project has reduced the outbreaks of water-borne diseases. The remaining 10 (5.0%) also indicated that the projects have provided more direct and indirect jobs in the community.

It can be concluded that the three major economic impact of the project on neighbouring communities includes the indigenous people get job and increase their business, the community members enjoy hygienic environment and employment opportunities and the projects reduced the outbreaks of water-borne diseases.

3.5 What is the Project Performance Duration?

Meeting requirements is one of the key success factors for project management. To measure this factor you need to develop measures of fit, which means the solution completely satisfies the requirement. A requirements performance index can measure the degree to which project results meet requirements. Types of requirements that might be measured include functional requirements (something the product must do or an action it must take), non-functional requirements (a quality the product must have, such as usability, performance, etc.). Fit criteria usually derived sometime after the requirement description is first written. You derive the fit criterion by closely examining

the project performance duration against the payback period of the project. This will help the sponsor to make a decision on the viability of the project.

3.6 Accra Sewage Systems Performance Duration

In order to address this, the participants were asked to express their opinion on the performance duration for the entire project after construction.

The responses are quoted below:

- Well, such projects can take 8 years before any other or major maintenance of the project with maintenance mentality. *(DP), (FMI) and (FM2)*
- Ok, for this issue the project can be use close to 8 years without a major shut down. *(M), (HOM) and (GM)*
- Most at times, the project can take 8 years before a total change in equipments, but we do regular maintenance and upgrade. *(HOD), (S), (PE), (ITO) and (SM)*

Under the project performance duration, twenty (20) interview questionnaires was disseminated to the focus group which was the staff of AMA and SSGL, all the twenty respondent indicated that, the project performance duration is 8 year. Almost all the participants suggested that the project would last for 8 years before a major maintenance of Accra Sewerage System project.

3.7 What is the Payback Period for the Project?

In trying to answer the research question above, respondents were asked to provide the payback period for the project. From the responses as given by the participants, the payback periods for the project were between 8 and 15 years interval. While some reported that the payback period was 8 years, others also reported 15 years interval. The responses are quoted below:

- Well, usually the payback period for one project is within 15 years interval. *(HOD), (S), (PE), (ITO) and (SM)*
- Mostly, the payback period for such project is estimated at approximately 8 years. *(M), (FMI), (FM2), (HOM) and (GM)*

It conclude that the payback period for a project is estimated to be approximately 8 years. The finding supports the work of Femi (2005), who concluded that payback period, is assume to mature in 8 years interval.

3.8 Analysis of Project Viability and Payback Period

In analyzing the project viability and payback, it is therefore necessary to apply the project-financing model known as the Payback Period. Payback Period is the time in which the initial cash out flow of an investment is expected to be recovered from the cash inflows generated by the investment. It is one of the simplest investment appraisal techniques.

Formula

The formula to calculate payback period of a project depends on whether the cash flow per period from the project is even or uneven. In case they are even, the formula to calculate payback period is:

$$\text{Payback Period} = \frac{\text{Initial Investment}}{\text{Cash Inflow per Period}}$$

When cash inflows are uneven, we need to calculate the cumulative net cash flow for each period and then use the following formula for payback period:

$$\text{Payback Period} = A + \frac{B}{C}$$

In the above formula, **A** is the last period with a negative cumulative cash flow; **B** is the absolute value of cumulative cash flow at the end of the period A; and **C** is the total cash flow during the period after A. The *decision rule* this

model is “accept the project only if its payback period is LESS than the project performance duration”. Therefore with an initial investment of \$25,000,000 and \$500,000 cash inflows from Ghana per month:

Project Initial Investment = \$25,000,000

Cash Inflows per Months = \$500,000

Project Performance Duration = 8years

Therefore:

$$\text{Payback Period} = \frac{\$25,000,000}{\$500,000}$$

$$= 50 \text{ months} \approx 4\text{years, } 2\text{months}$$

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 paid within fifty (50) months as against the project performance duration. It is true that the Accra Sewage System Projects was viable.

4. FINDINGS & CONCLUSIONS

4.1 Findings

It was concluded that the three major environmental impact of the sewerage system projects are that the projects have improved the living condition of the people and 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.

The respondents reveals that the social impacts that the Accra Sewerage System project have brought is an improved tourism business and attracted people to the plant and therefore in the community. The project sited in the community has help community members to be more responsible.

It was be concluded that the three major economic impact of the project on neighbouring communities includes indigenous people getting jobs and increase their business, the community members enjoy hygienic environment and employment opportunities and the projects reduced the outbreaks of water-borne diseases.

The duration given by the participants suggests the projects will last for more than 8 years before any major maintenance despite the ongoing regular or routine weekly and monthly maintenance. This period would have been more or close to 15 years if not cited close to the sea.

The payback period for Accra Sewerage System Plant is estimated to be approximately 8 years. It can therefore conclude that, there is statistically significant difference between project finance using Public Private Partnership to government projects.

4.2 Conclusions

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.

The findings of the study reveals that the three major environmental impact of the Accra Sewerage System Plant are that; the project have improved the living condition of the people and 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 that the Accra Sewerage System Plant has brought is an improved tourism business in the community and has help community members to be more responsible.

The duration for construction Accra Sewerage System Plant project was within the project plan time of two years and can be repeated in other districts in Ghana. The payback period for Accra Sewerage Sewage project system was estimated to be approximately 8 years. It was concluded that there is statistically significant difference between Project Finance using Public Private Partnership to finance government projects.

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