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Private sector involvement in urban water supply management, Ghana

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ABSTRACT

The performance of public utilities in low-income countries with respect to service to all customers, and particularly lower-income urban consumers, is understood to be limited in many cases. The Government of Ghana chose to implement a private sector management contract in order to deliver significant change in service delivery and financial viability. The five year management contract with Aqua Vitens Rand Limited ran from 2006 to 2011 and was not renewed.

This study investigates the public utility outcomes, both as a state owned corporation and a state owned limited liability Company, and compares those outcomes with the achievements of the private operator through a Management Contract. The latter two management models operated under the oversight of the newly formed economic regulator, the Public Utility Regulatory Commission in 1999 and any effect of that regulation is considered. The hypothesis of the study developed in 2008 was that "*a management contract would not provide the necessary level of empowerment, incentives and commitment and access to resources for a private operator to adequately and efficiently perform even where there is an established economic regulator with a clear mandate".*

The case study approach was employed for the study data was gathered on the operations, activities, regulation and management of the urban water utility through documentary review, key-informant interviews, household surveys, public hearing meetings and user observations. However, three major cities including Accra, Kumasi and Tamale were used for the household survey. These three cities were carefully picked out taking into account the political, economic, geographical, social and cultural significance that each of the them represents and commands in Ghana.

Analysis of Variance (ANOVA) and Paired t-Tests were performed to compare the financial and operational/technical performances between GWSC and GWCL, GWSC and AVRL, and GWCL and AVRL in view of the fact that all observations were taken from the same or matched subjects. In addition, post-hoc tests were conducted after performing ANOVA tests using Tukey's HSD tests to determine which of the groups in

the sample differ. And finally, results of the study were analysed and interpreted using secondary data from the literature review.

The study found that, both operationally and financially, there were no significant improvements during the period of the private operator compared with that of Ghana Water and Sewerage Corporation and Ghana Water Company Limited in areas such as water production, customer metering, non-revenue water, billing efficiency, bill collection efficiency, days receivables, liquidity, operating, profitability and labour productivity ratios, water tariff, creditworthiness and level of investment. Not only that, but also, the study revealed that the two previous reorganisations failed to make any significant difference. Averagely, the private operator reduced non-revenue water from 51.62% to 49.22% over the 5-year period. Overall, all three regimes exhibited high levels of inefficiency and ineffectiveness in reducing non-revenue water. Political patronage, nepotism, cronyism, tribalism and corruption have eaten deep into the fabrics of the public water utility resulting in a high labour productivity.

Finally, the anticipated capital required for investment could not be accessed, a responsibility that remained with government, and the capability of the contractor did not appear to be strong enough to overcome the resulting challenges.

In a single urban water supply system of Ghana, the research investigated and compared performances of three different regimes of management models over a 27-year span and also assessed the suitability of the form of private participation and net improvement the management contract brought to the urban population. The study showed that the two previous reorganisations or management models failed to make any significant difference and thus provide a unique contribution to academic knowledge and understanding. It shows that the success or failure of the urban water utility of Ghana is independent of the management models employed in view of the fact that all management models employed under all three regimes showed no significant differences. Instead, its success may be residing in other factors including competence of system managers, political will of governments, good institutional culture, level of investments, quality of management contractor, leadership style and finally the attitude of consumers towards such reforms as in the case of Uganda.

Overall, it appears that further research into the role of the private sector and the capabilities, or otherwise, of the particular approach of management contracts is not required. Nonetheless, the underlying challenge of delivering potable water to all urban consumers in an efficient and sustainable manner remains. How this can be financed, facilitated, encouraged and achieved is clearly an area deserving of further research. Finally, further research is required to determine the extent to which managerial performance and the local environment of a water utility influence non-revenue water.

Keywords: Urban water supply; public private partnership; Ghana

DEDICATION

I dedicate this work to my lovely wife Selorm Gifty Bansah and my three great children Nayra Komla Abiwu, Nunya Komla Abiwu and Nunana Kwaku Abiwu

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1.1 Introduction

Water is vital to human life and has no substitute. Nevertheless, human attitude, behaviour and activities in addition to the ever increasing human population continue to make drinking water scarcer around the globe every day, now becoming more expensive than petrol and diesel as in the case of Oman and Dubai. The United Nations estimates that by 2050, the world's population will rise to between 7.8 and 11.9 billion with a 'medium variant' estimate of 9.2 billion people (UNESA, 2007) as cited by (Black et al., 2008). For that number of people, it is estimated that 1.1 billion people do not have access to improved water supply and 2.6 billion people are without improved sanitation globally with sub-Saharan Africa having the highest proportion of the people without improved water (UNICEF/WHO JMP, 2012). Within the last two decades, the major cities of Ghana, the focus of this study, have seen a worsening situation in water services supplied to the urban population - a situation which cannot be said to be peculiar. In many low income countries, urban water supply systems are facing an acute crisis (Nickson, 1997).

Urban population growth has greatly outpaced the rate of growth of infrastructure in many developing countries. When coupled with poor infrastructural development policies of their respective governments, this somewhat accounts for the negative trend in the urban water supply sector. For instance major industries, and for that matter job opportunities, could only be found in the large cities of low-income countries. Ultimately, the growth of the cities and towns together with rapid increase in urban populations implies that the peri-urban areas will grow much more quickly than formal urban centres (Osumanu et al, 2010).This situation poses additional water and sanitation service challenges, particularly to the poor in the cities. Ghana is a typical example of Africa's poor water supply and sanitation situation. The 2000 population census confirms the JMP's position to the extent that Ghana's statistics on water supply and sanitation reflect the bigger picture of continental situation in Africa: one in three Africans do not have access to adequate water supply and sanitation. Admittedly, it is a huge burden and becoming a difficult task for many governments in the developing world to fix. Consequently, lack of these services affects the health and the environments of the people living in the peri-urban and formal urban areas (Mulenga et al., 2004).

In an attempt to address these water challenges, the third target of the seventh goal of the UN Millennium Declaration, signed in September, 2000 seeks to halve the proportion of people without sustainable access to safe drinking water and basic sanitation by the year 2015. The adoption of this target within the Millennium Development Goals (MDGs) is laudable. However, this target can only be achieved if the challenge of lack of capital investment for infrastructural development and expansion are critically and carefully considered along with a similar focus on improving the management of existing and new infrastructure. Furthermore, it must be noticed that even though some of these countries naturally have scarce water resources, which are a legitimate reason for limited water supply, lack of good quality drinking water in some other countries, including Ghana could hardly be attributable to scarcity of water resources. It is largely due to a lack of sufficient capital investment in the sector coupled with fragmented responsibilities of sector institutions, corruption, lack of autonomy of the utility due to political interference, and inefficient management of the available resources. According to Cosgrove and Rijsberman, (2000) it is not about having too little to satisfy our needs. It is a crisis of managing water so badly that millions of people and the environment suffer badly.

1.1.1 The challenges in the urban water supply sector in Ghana

The endemic abysmal performance that spread across the entire spectrum of the public sector during the late 1970s and early 1980s in Ghana inevitably resulted in the massive reforms that swept through the entire public sector in the 1980s. These challenges became an integral part of the Economic Reform Programme (ERP) which started in 1983, primarily supported by the International Development Association (World Bank). Poor performance within the public sector at the time led to its over-reliance on government and so privatisation and decentralisation were considered appropriate for addressing these challenges (Amis, 1998). During the same period, GWSC was identified as one of the most critical and important State Owned Enterprises that needed restructuring due to its financial and social significance. Apparently, direct privatisation was considered as the better option by the World Bank rather than institutional reforms at the time through “hard budgets” and autonomy of the public sector (Amis, 1998). Critics alternatively argued that privatisation damages the quality of public services and undermines public accountability (Cook, and Minogue, 2005).

These institutional developments were aimed at creating a water supply organisation that could meet the changing environment in which it had to operate. Rapid growth in the urban population in Ghana had significantly contributed to the ever-increasing demand on the water utility in the urban areas in Ghana and in Accra, problems of both water supply and distribution remaining serious (Van Rooijen, 2008; Rakodi, 1996). The Ghana Living Standard Survey, Round 4 (GLLS4) revealed that approximately forty percent of urban families were relying on neighbours and vendors for their water in Accra and only 45% of the population had a household or at best a yard connection including the urban rich (Van Rooijen, 2008). What really worsens the situation is that, in Accra, boreholes are not a viable alternative for unserved peripheral communities because of unsuitable ground-water conditions which further compound the water problems in the city (Rakodi, 1996).Along the coastal zone of Ghana, the potential of increasing the use of groundwater is limited by saline intrusions in shallow aquifers. In other areas, inadequate borehole yields lead to “borehole dryness” in the Upper East, Northern, Upper West and some other parts of the Brong-Ahafo regions (MWRW&H, 2007). Available figures previously mentioned, reveal that surface water can sufficiently meet the present and future water demands of the country. It is therefore obvious that the challenge of the urban water supply sector could hardly be attributable to scarcity of water resources in the country. Nevertheless, the researcher takes consolation in the fact that “problems that result from a failure to expand supply as fast as demand or from mismanagement are easier to address than those that stem from scarce and costly raw water”(Alcazar et al., 2002). For cities, the availability of surface water sources requires capital intensive and operationally expensive abstraction and treatment systems, necessarily demanding some form of centralised organisation to develop bulk water provision. Mis-management of such organisations, although in principle being ‘easier to address’, often appears to be more intractable than the lack of water itself – some consolation?

Generally, low water tariffs, macro-economic crises, general mismanagement, bad water policies and corruption, coupled with weak regulatory frameworks, have significantly affected the effectiveness and efficiency of the public water utility resulting in the water utility’s heavy indebtedness and its perennial dependence on the meagre resources available from central government. From the financial analysis that will be reported later and the reports that some of the equipment was obsolete (over half a century old), therefore operating well below design capacities, the challenges that faced managers daily become ever more apparent. Consequently, generating sufficient

funds to meet financial obligations (maintenance and operational expenses, debt service charges, depreciation, and development costs) became a perennial challenge to the water company.

In 1998, the urban water utility (GWSC) had a total of 210 water systems throughout the country. This has since reduced to 84 systems by 2003 following the transfer of some of the small systems to the district assemblies (GWCL, 2003) and by July 2006, GWCL was operating only 82 urban systems with an average daily output of 570,000 m^3/day as against an estimated daily demand of 1,050,000m^3/day (i.e. 54.5% coverage). From 1990 to 2002, water coverage had drastically decreased from 76% to 60% while unaccounted-for water was 50% throughout this period (Nyarko, 2007). Water rationing to many customers became common with only a few consumers able to get 24-hour continuous supply (MWRW&H, 2007; Conteh, 2008). Throughout the 1990s, Ghana Water and Sewerage Corporation became notoriously insufficient, with unaccounted-for water constantly remaining at about 50% (Fuest, 2006).

Residents of most urban communities including Accra, Kumasi, Ho, Takoradi, Cape coast, Koforidua, Sunyani, Tamale, Wa and Bolgatanga almost invariably rely wholly on piped water supplied by the urban water utility. The problem of direct interference of politicians in the hiring, transfer, promotion and firing of utility personnel, especially at the highest level of management, was common in Ghana (Nickson and Franceys, 2003)which is evident in GWSC/GWCL having seven managing directors within a period of 6 years (i.e. between 1987 and 2003). By Statute, the Board of Directors and Managing Directors of GWSC/GWCL are appointed by government thereby making them more vulnerable and accountable to the politicians rather than the customers in order to protect the positions they occupy. GWSC operations were conducted more as a social service with government subvention ranging between 30% and 60% of the recurrent expenditure from 1965 to 1986 (Gyau-Boakye and Ampomah, 2004). One of the mandates of the public utility that is crystal clear in the Act 310 of 1965 under section 7 which established the public utility stipulates that “the corporation shall cause its affairs to be managed in accordance with the practices observed in public utility enterprises and in particular shall cause its functions under this Act to be carried out so as to ensure that, taking one year with another, its revenue are equal to or greater than its outgoings” (Amis, 1998). Conversely, throughout the existence of the utility, it has not been able to fulfil this mandate satisfactorily due to very weak institutional frameworks and lack of autonomy within the sector.

Even though subsidy systems were often in place, a high proportion of the finance benefited higher-income residents because they were connected to the piped network while low-income settlements were excluded (Mitlin, 2004). It is estimated that the urban poor are charged between 3 and 15 times more than the normal utility price by water vendors (Nyarko et al, 2006). This trend further explains the underlying reasons for the government of Ghana in 1999 to incorporate the Ghana Water Company Limited as a public limited liability company in order to pave way for its planned privatisation, a plan that eventually saw the involvement of the private sector in June, 2006.

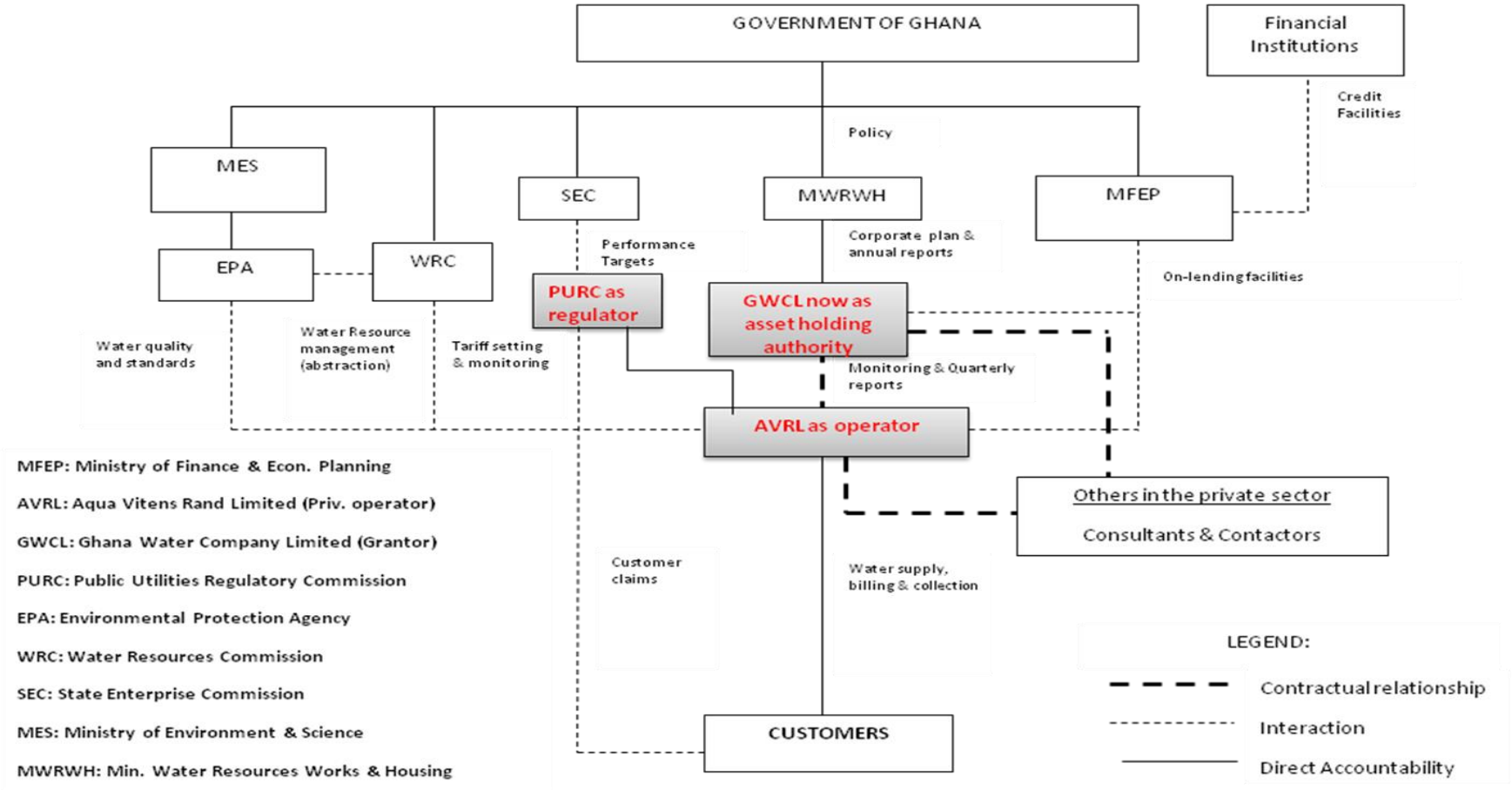
Meanwhile, the general justifications provided for the inefficiencies in the public sector are usually based on three theoretical models including;

- The property right theory (there is no ownership transference in the public sector);
- The public choice theory (bureaucrats maximise their own profit and not the common interest);
- The principal-agent theory (endorsed by information asymmetries (Marques, 2008)

In summary, prior to the involvement of the private operator in June, 2006, the urban water sector was faced with a number of challenges including:

- A need for improved management in operation and maintenance of water supply;
- Low service quality and coverage and the inability to link tariffs to level of service;
- Difficulty in setting tariffs to achieve cost-recovery in view of the high level of wastage;
- Inadequate revenue and investments (Sarpong and Abrampah, 2006).

Institutional structure of urban water sector in Ghana today



1.2 Justification for the research

The rate of increase in the use of improved drinking-water sources from 77 to 87 percent between 1990 and 2012 was sufficient to achieve the relevant MDG targets globally. Nevertheless, in the World Health Organisation (WHO) African region including Ghana, the percentage of the population using improved drinking water increased from only 50 to 61 percent in 2008 which remained well short of the 68 percent needed in that year to remain on course to achieve the MDG targets (WHO, 2010). Fundamentally, Ghana's development agenda is driven by the Growth and Poverty Reduction Strategy (GPRS II) and draws its commitments from the Millennium Development Goals (MDGs – legally part of the constitution), New Partnership for Development (NEPAD), and the obligations set out in the constitution of Ghana. Evidently, Ghana's commitment to the principles of the MDGs was exhibited through the endorsement of the principles for water to improve access to safe water supply and sanitation of the population without access to basic water supply and sanitation by 50% by 2015 and 75 percent by 2015 (MWRW&H, 2007).

However, as pointed out earlier, all signs in the urban water supply sector in Ghana suggested that the situation was getting worse and worse and until corrective steps could be taken to reverse the trend, it would continue to do so. It is commonly quoted that "The water crisis is mainly a crisis of governance, much more than a crisis of water shortage" (Global Water Partnership, 2013) and the real tragedy is its effects on the lives of the urban poor. However, the question is what are truly the underlying reasons for the challenges in the urban water supply sector over the years? Could it be institutional, political, social, cultural, attitudinal, technological, economic, financial, or a combination of all? Compounding the sector dynamics further, is the involvement of the private operator making it yet more complex?

Additionally, negative perceptions that are usually held by the public and some politicians against private operators in the water sector stems from lack of knowledge about positive contributions that private operators have made in other countries leading to a widespread resistance to private participation in water supply (Marin, 2009), as is the case in Ghana. This makes this research even more relevant in order to explore the sector challenges and determine whether or not the arrangements with private management contractor, AVRL, in any way brought improvement to the urban

population. This will be determined through a careful assessment of the regulatory frameworks, political, economic, legal and social environment against the set targets of the management contract with Aqua Vitens Rand Limited

1.3 Research aim, hypothesis and objectives

The overall aim of the research is to assess the suitability of the form or model of private sector participation that was introduced in the regulated urban water supply sector in Ghana and also to assess the net improvement that the arrangement brought to the urban population. The research seeks to contribute to the understanding of the suitability of the management contract with Aqua Vitens Rand Limited in the urban water supply sector. According to the World Bank, (1994), the regulatory capacity of most African countries including Ghana is limited and therefore the involvement of the private operator in the management and operation of the public water utility poses a special challenge. Generally, political interference, lack of investment and political patronage have continued to work against service goals set, cost minimisation targets, and investment incentives of the water utility. In addition, the design of a good contract and efficient monitoring require sophisticated institutional capacity; however these tasks are difficult to be undertaken in most developing countries. In view of the above reasons, the hypothesis of this research is that:

> *"A management contract does not provide the necessary level of empowerment, incentives, commitment and access to resources for a private operator to adequately and efficiently perform even where there is an established economic regulator with a clear mandate"*

The objectives of this research are to:

a) Investigate the context within which Ghana Water and Sewerage Corporation (GWSC), Ghana Water Company Limited (GWCL), Aqua Vitens Rand Limited (AVRL) and Public Utilities Regulatory Commission(PURC) operated in Ghana;
b) Evaluate the performance of Ghana Water and Sewerage Corporation/Ghana Water Company Limited (Public utility) over the period preceding the management contract;
c) Evaluate the performance of Aqua Vitens Rand Limited (management contract);
d) Investigate the effectiveness of the Public Utility Regulatory Commission;

e) Evaluate the level of empowerment, incentive, commitment and access to resources necessary for efficient service delivery by service providers.

Taking into account the numerous challenges facing the urban water sector in Ghana prior to the involvement of the private operator (AVRL), one may be tempted to ask whether the appalling catalogue of failures within the sector could have any immediate solution in sight through the new arrangement with AVRL. Nevertheless, the researcher took consolation in the claim that “problems that result from a failure to expand supply as fast as demand or from mismanagement are easier to address than those that stem from scarce and costly raw water” (Alcazar et al., 2002).

This research therefore attempts to answer the following questions:

- To what extent have the activities of the economic regulator influenced the performance of GWCL or AVRL by way of ensuring that service delivery is efficient, effective and sustainable?
- How have national policies and institutional frameworks in the past influenced the service delivery of the public utility?
- What is the appropriate set of evaluation indicators for public and privatised water utility and could there be a new way of assessing or evaluating the performance of the urban water utility under the present management contract in Ghana?
- How could data be effectively generated to populate the performance indicators for analysis?
- What aspects of, and possibly to what extent, the management contract have empowered or conflicted with the organisational behaviour of service provision?

2 Literature Review

2.1 Introduction

This section of the thesis investigates the research literature on the general concept of public private participation (PPP) in water supply management in lower-income countries with a major emphasis on management contracts. It discusses the different modes of partnerships or arrangements that exist between the private sector on the one hand and governments or public institutions on the other. Overall, the chapter reports brief descriptions of different modes of private sector partnership, explaining how each model is engaged and how the sector is regulated. From the literature, the limitations and advantages associated with each approach are highlighted, taking into account the political, institutional, legal, economic and social context within which they may occur. It is however important to state that the academic literature on management contracts is limited.

2.2 A brief historical background of Ghana

The republic of Ghana is located in West Africa and bordered by three francophone countries namely; Burkina Faso to the North, Cote d'Ivoire to the West, Togo to the East and to the south is the Gulf of Guinea. Ghana covers a total land boundary of 2,094 kilometres with a total land mass of 238,533 square kilometres (i.e. land: 227,533 square kilometres and water: 11,000 square kilometres) and its climate is tropical. The word 'Ghana' means 'warrior king'. Before independence, the Republic of Ghana was known and called "Gold Coast" until it was renamed Ghana in 1957. The Republic of Ghana became the first sub-Saharan African country to gain her political independence from their colonial masters (the British) on the 6th of March, 1957. Administratively, there are ten regions in Ghana, with Accra as the capital city, the regions being further sub-divided into districts. From time to time additional districts and municipalities are created for both administrative and political reasons. For instance, in the year 2007, twenty-five more districts and three municipal assemblies were created by President John Agyekum Kufuor bringing the total number of districts in Ghana to 166. In February 2008, additional districts were created and some were also upgraded to municipal status thereby further increasing the number to 170. It is explained that the division of the country into regions and districts is largely done to maintain the large cultural groups as homogenous units and also ensure efficient administration of

districts and regions (Dickson 1971, 1975; Bening 1999; Ofori 2002 as cited by (Aryeetey et al., 2009). It is unclear to what extent such ongoing divisions further administrative and local service management goals.

The population of Ghana has more than quadrupled since 1957 and forty-four percent (44%) of the 18.9 million people live in the urban areas. Almost half of Ghana's 8.3 million urban residents live in the country's largest cities: Accra and Kumasi (GSS, 2002) - a trend that clearly explains the extreme level of pressure that the urban population may be exerting on public utility services. About 50.9 percent of the national population is urban (GSS, 2012) with an annual rate of urbanisation of 3.4 percent (CIA World Factbook, 2011). The country's urban system is dominated by Accra, Kumasi, Tamale, Sekondi-Takoradi, and Tema (Owusu 2005, and 2008; as cited by (Aryeetey et al., 2009)).

Table 2-1Population Trend of Ghana

Year	Total Population
1960	6,726,815
1970	8,559,313
1984	12,296,081
2000	18,912,079
2010	24,658,823

Source: **Compiled from the 1960, 1970, 1984 and 2000 Population Census reports Central Bureau of Statistics, Ghana Statistical Service**

By Ghana Statistical Service's (GSS) definition, an urban locality is any human settlement with a population size of 5,000 or more; a definition that has greatly conflicted with the definitions for small towns by the Community Water and Sanitation Agency (CWSA) and that of the National Water Policy (NWP). Like in many African countries, about 60 to 70% of the urban population in Ghana lives in informal settlements with little or no access to basic services such as water, electricity, and sanitation. Most of these low-income dwellers live in the multi-occupancy building with single meters also known as the tenement houses or "compound houses" (UN Habitat, 2003).

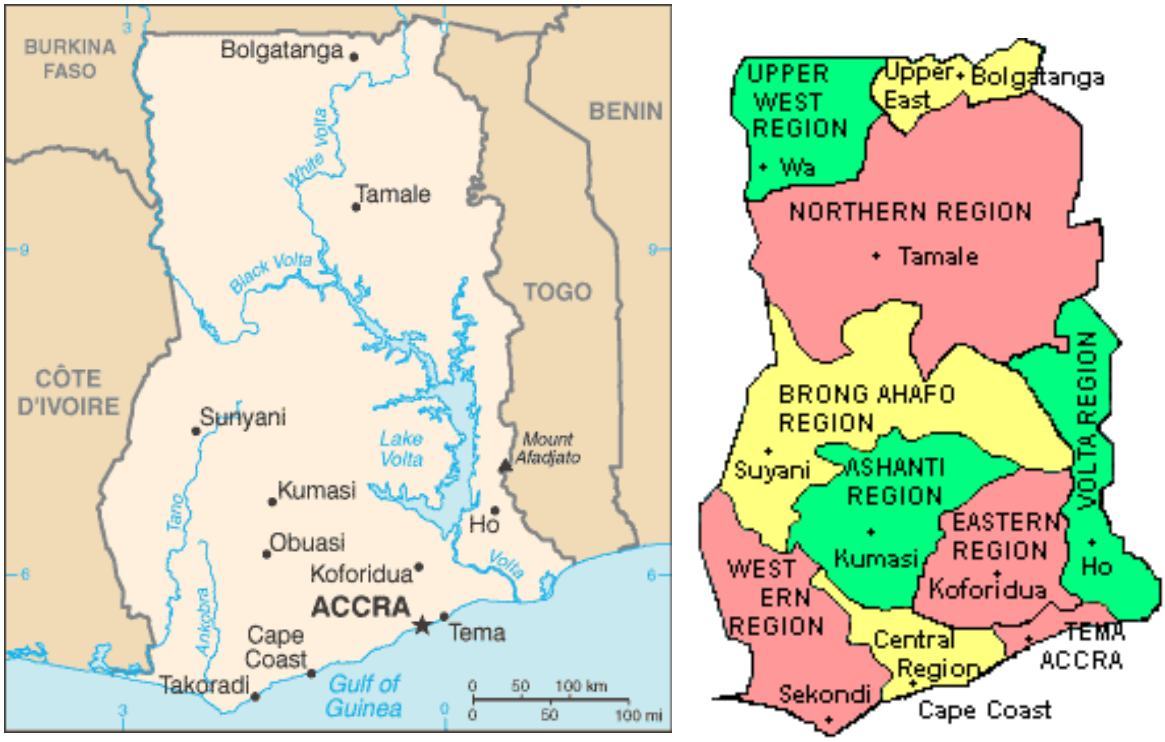


Figure 2-1 Maps of Ghana showing its boundaries and the ten regions [source: http://mapsof.net/ghana]

2.2.1 The political economy of Ghana

Historically, there have been a series of military coups that followed independence in 1957. This greatly interrupted the smooth democratic process and for that matter the development agenda of Ghana. Barely 8-years into independence, the first military coup was staged on the 24th of February, 1966 leading to the overthrow of the first democratically elected government under the leadership of Dr Osagyefo Kwame Nkrumah. From 1966 to 1981, Ghana experienced four further coup d'états. Nonetheless, since 1981 Ghana has enjoyed a stable political climate that has apparently made it a viable destination for international investments, assisted by the discovery of viable quantities of oil in 2007. Generally, the return of the country to democracy in 1993, continuing through multi-party elections in 1992, 1996, 2000, 2004 and 2008, marks a significant landmark in the socio-economic development and political history of Ghana. Undoubtedly, since 1993 to date, Ghana has been widely considered as one of Africa's most stable democracies which has subsequently made Ghana win for herself the (self-proclaimed) accolade *"Ghana, the gateway to West Africa".* Compared to the state of democracy practised in other African countries today,

Ghana could be said to be politically stable with good governance practices. Overall on governance, the respect for the rule of law makes Ghana perceived to be one of the better administered countries in the sub-region.

The economy of Ghana is 'mixed' according to economist's definition but has significantly or predominantly been driven by agriculture (see table 1.2). Data from the 2000 population census reveals that the agricultural sector alone absorbs 55 percent of the country's labour force and accounts for about 40 percent of the Gross Domestic Product (Aryeetey and Kanbur, (2008) as cited by (Aryeetey et al., 2009).

Table 2-2 Percentage distribution of GDP by sector and some other Economic indicators of Ghana

Item	**1970**	**1984**	**1989**	**1993**	**1994**	**1995**	**1996**	**1997**	**2006**	**2007**	**2008**	**2009**
Agriculture	47	52	47	42	41	41	40	40	30.4	29.1	31	31.7
Industry	18	11	14	15	15	15	14	14	20.8	20.7	20.4	18.9
Services	35	37	39	46	47	47	48	48	48.6	50.2	48.6	49.5
Source: Ghana statistical Service, April, 2011												
Economic Indicators												
	Year											
Item	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	
GDP (US$x10^9)	4.98	5.31	6.17	7.63	8.88	10.73	12.74	15.02	16.65	15.51	17.89	
GDP per capita (US$)	270.63	281.47	318.41	384.32	436.04	513.76	594.51	683.57	739.13	671.33	754.71	
Average annual inflation (%)	25.15	32.91	14.82	26.68	12.63	15.11	10.15	10.73	16.52	19.25	10.60	
Deficit (% of GDP)	-7.77	-5.41	-1.08	-1.64	-3.98	-8.25	-9.93	-12.0	-18.7	-5.10	-12.78	

Source: International Monetary Fund, World Economic Outlook Database, April, 2011

Historically, Ghana has experienced very volatile and high inflation rates derived from external shocks, unsustainable macroeconomic policies and, sometimes uncertain politics. The structure of the economy of Ghana has not changed significantly from what was inherited from the colonial period (Aryeetey and McKay, 2007) during the last three decades. However, by improving policies and institutions and investing in infrastructure and basic services, Ghana has experienced high economic growth rates averaging around 5 percent per year and has since become one of the best-performing economies in Africa, attracting significant foreign direct investment (FDI) inflows

(Dagher, et al., 2010). Steadily, the Real Gross Domestic Product (GDP) growth increased from 3.7 percent in 2000 to 7.3 percent in 2008. In 2002significant debt relief provided the country with some fiscal space to undertake critical infrastructure investments, particularly in the energy and road sectors. In addition there has been targeted social spending, all under the Ghana Poverty Reduction Strategy (GPRS). The combination of higher output growth, declining inflation, and improved social spending under the GPRS framework significantly contributed to reduced poverty levels (Duffuor and Acquah, 2009). The implication of the foregoing for the urban water utility therefore is that, with the establishment of a relatively stable economic and socio-political environment, which has won the confidence of many countries and investors, the water utility should be able to effectively plan, formulate and implement its objectives with a reasonable degree of predictability.

1.2.3 Water resources and its potential in Ghana

Ghana is a riparian state and its water resources potential is classified under surface and groundwater sources with the surface water resources mainly coming from three river systems that drain the country. They are the Volta river system (composed of the Red, White and Black Volta Rivers and the Oti River), South-Western river system (composed of the Bia Tano, Ankobra and Pra rivers) and Coastal river system (composed of the Tordzie/Aka, Densu, Ayensu, Ochi-Nakwa and Ochi-Amissah) constituting 70%, 22% and 8% of the Ghana's total land area of 238,533 square kilometres respectively. Generally, Ghana's rainfall decreases from the south-western part (2,000mm/year) towards the northern part (950mm/year) and the south-east (800mm/year) of the country. The total average annual runoff is estimated to be 56.4 billion cubic metres, with the Volta river alone accounting for about 41.6 billion cubic metres.The Volta, South-Western and Coastal systems contribute 65%, 29% and 6% respectively. From surface water sources Ghana has access to about 39.4 billion cubic meters of water annually. The country is "underlain by three major geological formations including the basement complex comprising crystalline igneous and metamorphic rocks; the consolidated sedimentary formations underlying the Volta basin (including the limestone horizon) and the mesozoic and cenozoic sedimentary rocks" representing 54%, 45% and 1% of the country respectively (MWRW&H, 2007).

In the basement complex and the Volta basin, the depth of aquifers is usually between 10m and 60m with borehole yield seldom exceeding $6m^3$ /h while the aquifer depth in

the mesozoic and cenozoic formations is normally between 6m and 120m with average yields of 184m^3/h especially in the limestone aquifer. Groundwater occurrences in limestone formations are typically located within 120m and 300m depth yielding about 180m3/h. It appears therefore that Ghana does not face any acute water resource issues. However, the population growth rate, particularly the urban growth rate, means that the urban water supply sector faces the challenge of:

- Increasing and improving existing water sources, tapping new sources and managing catchments to eliminate or abate depletion and degradation of water sources;
- Meeting increasing demand with finite supplies; and
- Increasing degradation of water quality resulting in high treatment cost (MWRW&H, 2007).

2.3 The evolution of water supply sector in Ghana

The development of urban water supply systems in Ghana began during the colonial era in 1928 in Cape Coast. The service was run as a public utility enterprise by the Hydraulic Division of Public Works Department under the Ministry of Works and Housing, now known as the Ministry of Water Resources Works and Housing. Subsequently, the responsibilities of the Public Works Department were extended to include the planning and development of water supply systems in the whole country. In 1948, the Rural Water Development Department was established to take care of water supply in rural areas separately. Later, the Water Supply Division of the Public Works Department was created in 1958, under the Ministry of Works and Housing and charged with the responsibility for both urban and rural water supply.

Following the investigations and recommendations of WHO during a severe shortage of water in 1959, when Ghana faced significant health challenges, the Act 310 of 1965 was enacted to establish the Ghana Water and Sewerage Corporation (GWSC), and mandated to provide water and sewerage services to both the urban and rural population with the additional responsibilities of:

- conducting research relative to water and sewerage.
- making engineering surveys and plans.
- constructing and operating water and sewerage works.
- setting standards, prices and collection of the revenues.

By the late 1970s to early 1980s, the effectiveness of the operations of Ghana Water and Sewerage Corporation declined significantly (GWSC, 1993). According to (Listorti and Doumani, 2001), “the water supply systems in Ghana deteriorated rapidly during the economic crises of the 1970´s and early 1980´s when Government’s ability to adequately operate and maintain essential services was severely constrained.”

2.3.1 Background to reforms in Ghana’s water supply sector

The declining performance of Ghana Water and Sewerage Corporation in the late 1970s and early 1980s called for interventions in 1971, 1981 and 1988 to reverse the trend with the support of external financial institutions, countries and funding agencies. From the mid 1990s, various governments have implemented a string of reforms in the water sector in attempts to enhance efficient production and utilisation of water. These reforms resulted in the re-alignment of key institutions in the sector. Meanwhile, in spite of these interventions, lack of an effective interface among key holder institutions and interest groups remained a major concern in the water sector (MWRW&H, 2007). Therefore, in a bid to achieve the initial objectives for which GWSC was established in 1965, a Californian consulting firm, Public Administration Services (PAS), was engaged in the 1970s to advise the government on the restructuring of the water sector. That advice culminated in several changes in the organisational structure of the utility. Significant among these changes was the appointment of Regional Managers to decentralise decision making within the corporation, also devolving authority to the regions where Regional Managers were assigned to become representatives of the Chief Engineers, acting as heads of the utility in their respective regions (Halcrow, 1995).

Nevertheless, after operating with this arrangement for almost a decade, it became apparent that there was the need to undertake further revision of the organisation’s framework. In 1985, (PAS) was engaged for a second time to undertake a strategic review that led to the creation of two positions of Deputy Managing Directors (one in-charge of operations and maintenance, the other in-charge of Finance and Administration) thereby replacing the post of Chief of Operations. Another change that was effected due to the reform was the strengthening of the role of the Regional Managers to Regional Directors in order to give yet more power and autonomy to the regions. Despite the changes that were made in the organisation’s framework, the status-quo reportedly remained unchanged to the extent that the head office of

“GWSC, which was still responsible for payments of chemicals, imported goods, electricity consumption and Income Tax and Social Security and National Insurance Trust (SSNIT) for all GWSC staff, regained financial control over these activities and severed autonomy in 1990” (Halcrow, 1995). It is significant to indicate that apart from the above mentioned reforms and counter reforms that took place in Ghana’s water sector, several studies have also been undertaken to improve the performance of the public water utility. Many of the recommendations that these studies provided could seldom be efficiently and effectively implemented if there were any attempts at all to implement them.

In 1994, the Government of Ghana engaged a new group of consultants, Sir William Halcrow and Partners Limited to undertake a further feasibility study on the water sector. At the end of this study on the feasibility and implications for restructuring the non-rural water sector, the following options were recommended for implementation (Halcrow, 1995):

1. Convert Ghana Water and Sewerage Corporation into one public limited liability company with substantial decentralisation and private sector participation (PSP) in selected key functional activities;
2. Establish a joint venture between GWSC and an external company (or multiple companies) in a new operating company;
3. GWSC to become a producer and wholesaler of bulk water with private sector water distribution;
4. Public Private Partnership Lease arrangement(s) of self-contained systems from source to end user;
5. Spin-off (make into a separate legal entity) Accra-Tema Metropolitan Area (ATMA) and the largest urban centres and then commercialise the remaining regions in a downsized GWSC;
6. Engage an international operator to assist in the interim management of all GWSC’s regions with a view to an early transfer of the profitable urban centres to a long term concession; and
7. a refocusing of objectives of the remaining GWSC regions to facilitate their longer term transfer to a private concession;
8. Retain GWSC as existing entity to own the infrastructure assets and engage an operator to undertake GWSC’s revenue collection and customer service activities.

Additionally, a number of combinations were considered that gave alternatives to the primary options stated above. These alternatives fall under option 1 where;

1a. GWSC would be retained as a central procurement agency with a mandate to provide operational and commercial support to autonomous regional units through the use of annual or term contracts for the private sector supply of goods and services

1b. Each autonomous regional unit would be encouraged to pursue private sector participation (PSP) by maximising the outsourcing of services in accordance with good business practices and at economic costs; the regional unit itself being responsible for the consequence resulting from any failure.

In parallel to this consideration of the best means of managing in the urban sector, Ghana's review of the water and sanitation sector during the International Drinking Water Supply and Sanitation Decade (1981-1990) influenced the policy direction of government in the water sector in 1994 to undertake another major water sector reform that brought about the historical launching of the National Community Water and Sanitation Programme (NCWSP). Later, the NCWSP was given a semi-autonomous status and became the Community Water and Sanitation Division and finally to the present the Community Water and Sanitation Agency (CWSA) through Act 654 in 1998. This led to the transfer of most small systems of Ghana Water Company Limited to the district assemblies as community managed water systems starting 1998 (MWRW&H, 2007; GWCL, 1999) as shown in Table 1.3. Ghana Water and Sewerage Corporation was converted into a limited liability utility to function solely as an urban water supply company.

Table 2-3 Ghana's universal water supply systems since independence (1957)

Year	Total number of water systems		Total number of smaller systems transferred to the district assemblies
	Available	Operational	
1957	35	35	
1961	69	69	
1979	194	194	
1995	210	138	
1996	208	182	
1998	210	190	
1999	100	100	115
2000	98	81	120
2001	84	82	124
2002	84	83	124
2003	84	82	124
2006	82	82	124

To be successful in delivering services, these organisational re-arrangements required access to capital for new investment, capital which consumers and the Government of Ghana (as ultimate owners of the systems) were either unable or unwilling to provide.

A multiplicity of local, international multi-lateral and bilateral financial institutions over the years have therefore significantly supported and influenced the policies and management of Ghana's urban water supply sector. These have included the World Bank (International Development Agency), the African Development Bank (ADB), the United Kingdom's Department For International Development (DFID), Kreditanstalt für Wiederaufbau (KfW) of Germany, France (AfD), Canadian International Development Agency (CIDA), Overseas Economic Cooperation Fund (OECF) of Japan, Finland, Netherlands, Italy, and Australia. In addition the Social Security and National Insurance Trust (SSNIT) was one local institution that provided funding to the public utility. Each of these donors/contributors have had their own, often differing, views on how to develop, and most critically manage, sustainable water services in Ghana.

2.3.2 Engaging the private operator in the urban water supply sector

The poor performance of the urban water utility, Ghana Water and Sewerage Corporation/ Ghana Water Company Limited could not go unnoticed in the mid-1990s, a period that experienced ambitious reforms in the international water sector. The water sector in Africa had little or no success story to tell in spite of all efforts directed towards improving the sector through various economic, structural and infrastructural development programmes. Many governments in the 1990s embarked upon reforms in the sector in order to restore them to sound operational and financial footing after long periods of poor performance. Even though the urban water sector was earmarked for a major reform by embarking on public-private partnership projects during this period, the sector saw only limited restructuring. The late 1990s through to 2006 saw a perennial oscillating trend of limited water production and poor service provision by the public water utility (Ghana Water Company Limited). This trend during this period became a normal and daily phenomenon which attracted the attention of government and the World Bank. And at the behest of the World Bank, following earlier attempts to offer private 'concessions', later 'enhanced leases', to Business Units 'A' and 'B' (focussed upon Accra and Kumasi respectively, with smaller towns variously assigned) a 5-year management contract was entered into with an International Consortium, Aqua Vitens Rand Limited (AVRL), in June, 2006 to distribute water and collect revenue to make the operations of public water utility profitable; a contract model with limited responsibility both in scope and time. The intended goal of the paradigm shift sought to bring new expertise, financial resources, cutting-edge technology and a commercial orientation that the private sector is understood (not by all) to deliver. However, the introduction of the private operator (AVRL) into the urban water supply sector in June, 2006 by the Mr John Agyekum Kufuor's-led New Patriotic Party government (January, 2001- January, 2009) in Ghana saw various degrees of agitations from opponents of private sector involvement in the urban water supply sector. Some indeed interpreted this force of change as a sale of Ghana's sovereignty. Others stressed the point that it would lead to the imposition of higher tariffs on poor consumers whose salaries and wages would be too low to pay for services that the private operator may provide.

The increasing demand for massive capital and infrastructural investment and the need to bring to bear a new managerial approach with a commercial orientation to the public utility could be said to necessitate the involvement of the private sector in Ghana's urban water supply sector. However, what is unclear is whether it was the good

appreciation of the role of the private sector in public utilities in injecting managerial and economic efficiency that promoted the sector reform or not. Whatever the justification might be, the reason for the government's decision or action is no longer relevant now. What matters is how or indeed whether, government and society used the skills and entrepreneurship of the private sector (AVRL) to bring about the desired results. This was also seen to require a strong and efficient legal and regulatory policy/ framework to protect the investor (government in this case), the private operator and customers by enforcing and implementing the service targets of the contract towards the realisation of the reform objectives. The key objectives of the policy reforms in the urban water sector in Ghana sought:

- "to attract greater capital inflows for the rapid expansion and rehabilitation of the water sector in order to increase accessibility to potable water that is affordable and reliable;
- to improve efficiency and cost effectiveness in the provision of water through improved sector management and the inducing of private sector entrepreneurial skills and culture;
- to minimise the financial burden on government as the sole equity owner and primary provider of needed sector infrastructure improvements and expansion; and
- to consciously expand both water supply and sanitation coverage to effectively impact positively on the health of the people" (MWRW&H, 2007).

One thing that is evident during the reform process was that little public consultations were undertaken. This could account for the hostile attitude of the consumers towards the private operator which could be a precipitating factor for future disputes and conflicts. Information on the earlier performance of urban water systems in Ghana was limited. Hence the lack of information hindered clear and undisputed target specifications in the contract, a condition which could be disastrous for the private operator and the contract awarder.

The overall urban water project had four components. The first component of the project was the system expansion and rehabilitation designed to:

- increase the amount of treated water for sale;
- extend service to low-income areas;

- rehabilitate existing network to reduce non-revenue water; and
- upgrade dam safety, deliver upgrades, procurement and installation of meters, provide engineering services, vehicles and equipment for regional and district offices (MWRWH, 2005).

The rest of the components included the public-private participation development, capacity building and project management, and severance programme. Funding for the project was provided by the World Bank (US$103,000,000), the Republic of Ghana (US$12,000,000) and Nordic Development Fund (US$5,000,000) all amounting to US$120,000,000. Under this arrangement, the private operator, as management contractor, was required to turn the fortunes of the urban water sector around over the 5-year contract period with the overall objective of restoring GWCL to a sound financial footing and also to make a significant improvement in the commercial operations of the urban water supply company. However the bulk of the much required new investment, supported by the World Bank's '$100m', was to be procured and managed separately by the remnant of GWCL acting as public sector 'asset holder'.

2.3.3 Public agitations against the involvement of the private sector in urban water supply sector of Ghana

Customarily, in Ghana water is regarded as a natural resource that God has freely given to humankind and therefore must be free for all. Naturally, water is a resource that is essential for the survival of the human race and the socio-economic development of every nation. Its commercialization through the involvement of the private sector therefore cannot easily be accepted without opposition from consumers who for several years have treated water as a 'social good' rather than an 'economic good', whilst knowing that the primary aim of any private enterprise is to make profit.

The arguments of consumers, civil society groups, experts and government for and against privatisation in the urban water sector, generated further anxiety as to whether the argument is about a "subsidy for the rich", rather than the welfare of the poor, and a financial burden for the government? While some argued that the only option available to government to rescue GWCL was to privatise its operations and management, others were vehemently opposed to it. Prior to the arrangement, civil society groups and Non-

Governmental Organisations such as the Committee for Joint Action (CJA), the Integrated Social Development Centre (ISODEC) and the Coalition Against Water Privatisation persistently resisted the reform in Ghana through demonstrations and radio talk shows, calling on the government not to engage the private operator. After the private operator was engaged they continually asked for the abrogation of the contract. Consequently, the partnership has generated a heated debate from two opposing groups. The major justification of the proponents of private sector participation is the inability of the public utility (GWCL) to provide the urban population with adequate, efficient and sustainable water supply. The proponents of public sector provision believe that water is a basic necessity of life which must be treated as a public or 'social good' rather than an 'economic good' and must therefore be managed by the public sector, recognising that a water enterprise exhibits a natural monopoly due to the cost of the distribution network. Human rights arguments were also advanced, similar to the case of Johannesburg where human rights activists took the private operator to court for using prepaid water meters. They maintained that government would not have adequate control over any private company that may be engaged which would lead to higher water tariffs, profiteering, poor water quality supply and the neglect of the urban poor. Others agreed that this was a risk because the contracts being envisaged were limited, typically 5years, and did not directly link investment to service provision. Therefore they could well focus only on improving service to existing customers rather than reaching the urban poor (Weitz and Franceys, 2002). K'Akumu (2006)however contends that no matter how natural a monopoly it may be, that does not explain why a natural monopoly must only be a public one and that after all, "it is easier to regulate (a private operator) rather than the public one". Nellis (1994), as cited by (K'Akumu, 2006), reaffirms this position by stating that, "private ownership will perform better than public ownership because:

- it establishes a market for managers, leading to higher quality management;
- capital markets subject private enterprises to greater security;
- private enterprises are much more subject to exit;
- politicians interfere less in the affairs of private enterprises than they do for public enterprises; and
- private firms are supervised by self-interested board members and shareholders, rather than by disinterested bureaucrats.

Conversely, Saal and Parker (2001) as cited by (K'Akumu, 2006) maintain that privatisation only increased profits, not productivity in the United Kingdom. It is therefore recognised that the mere transfer of a public utility to the private partner may not necessarily translate into improved performance.

2.1 The Public-Private Partnerships concept

Partnerships take different forms involving individuals, institutions, organisations on the one hand and governments or public institutions on the other with differing levels or degrees of responsibility, reward and risks. Privatisation is "the entire process of expanding the sphere of the market through a host of regulations that create an enabling environment for free enterprise to operate as a strategy for sustainable economic development" privatisation (UN-HABITAT, (1998) as cited by (K'Akumu, 2004). Public-private partnership has variously been defined by different scholars, institutions and governments around the world. In its narrow sense, "public-private partnerships are considered as distinct institutional models employed principally to develop infrastructure, including build-own operate-transfer (BOOT), build-operate-transfer (BOT) and lease-build-operate (LBO)" (Savas, 2000). The BBC (2003) describes PPP simply as any collaboration between public bodies, such as local authorities or central government, and private companies. The term 'Public-private partnership' has no legal meaning and can be used to describe a wide variety of arrangements involving the public and private sectors working together in some way" (The International Bank for Reconstruction and Development/The World Bank, 2009). A legally-binding contract between government and business for the provision of assets and the delivery of services that allocates responsibilities and business risks among the various partners is referred to as public private partnership and in such an arrangement, government remains actively involved throughout the project's life cycle (Partnerships British Columbia, 2011).

In its broadest sense, public-private partnerships are simply about "every type of interaction between public and private-sector actors" (Greve and Hodge, 2007). Two Dutch scholars, Klijn and Teisman, (2005) as cited by (Greve and Hodge, 2007), broadly explain the entire concept of PPP as "more or less sustainable cooperation between public and private actors in which joint products or services are developed

and in which risks, costs and resources are shared". Baxter et al. (2010) describe PPP as arrangements that are typified by joint working between the public and private sector and added that in the broadest sense of it, PPPs can embrace all types of collaboration across the interface between the public and private sectors to deliver policies, services and infrastructure. These arrangements are about challenging the principal-agent relationships normally associated with public-sector contracting and entering the area of principal-principal relations and win-win situations (Christensen and Lægreid, 2007).

Budgets of governments for infrastructure spending in the water and sanitation sector have always been a drain on economies of most low-income countries where urban population growth continues to outpace the rate of growth of infrastructure. Consequently, funding for urban water supply projects towards network expansion has always been limited. Poor service delivery, poor performance and mismanagement are the hallmarks of most publicly owned water utilities in these low income countries and thus pose a major challenge to all categories of consumers but particularly the urban poor living in slums. "Normally, at the confluence of overpopulation, economic deprivation and environmental degradation, people living in slums occupy a precarious position at the very fringes of urban life" (Ali, 2010).

In the early 1990s, many of the governments in low income countries attempted to rescue their respective urban water sectors through a range of institutional, operational and governance reforms but were unsuccessful. Subsequently, public-private partnerships became increasingly popular as a form of organising the interface between public and private sector organisations around the world in the expectation that private finance would bridge the investment gap (Hodge and Greve, (2005) as cited by Christensen and Lægreid, 2007). Increasing demand for capital investment therefore continues to drive the participation of the private sector in the urban water sector in the low income countries. According to (Marin, 2009), one of the key objectives of involving the private operator is to improve operating efficiency.

By the end of 2007 excluding China and two large private operators in Cote d'Ivoire and Senegal, there were more than 220 active water public-private partnership projects or schemes in 41 developing and emerging countries and served as many as 67 million consumers or more than 40 percent of the market (Marin, 2009). Overall, the concept of public-private partnerships raises the awareness that no single organisation can solve problems alone and that, to find solutions to complex public policy tasks,

public- and private-sector actors must form new institutional arrangements that allow for participation from both sectors (Greve and Hodge, 2007).

2.2 The debate on Public-private partnerships (PPPs) in the water sector

Since the early years of the 1990s, the policies, interest and influence of the World Bank, other international finance institutions and bi-lateral donor agencies developed towards the use of privatisation of the public sector to deliver reform and therefore improve services. The multi-laterals required indebted countries to subject national service institutions to public-private partnerships in the framework of structural adjustment programmes in exchange for loan guarantees (Green, 2003; Lobina and Hall, 2003; Sohail and Cotton, 2004) as cited by (Fuest and Haffher, 2007). Most lower-income economies were advised, and sometimes forced or pushed by the these donor agencies (in exchange for further disbursements of loans and or aid), to promote more efficient operations, increased investment and service coverage through privatisation of public utilities in order to reduce the financial burden on government budgets.

Although the World Bank and others pulled back from such a clear 'pro PPP' position in recent years, the question remains as to whether or not this policy has brought about the needed change or results that PPP projects or schemes have always suggested and expected to bring to the urban population most especially the urban poor who usually live in the slum areas? The debate over the contribution of the private sector in the urban water supply sector has continued to rage over the extent and quality of water supply services they provide and whether the new paradigm shift has served its original aims and objectives. According to Marin, (2009), experience has shown that the main attraction of the private sector into the water sector which had been presumed to be the ability to supply financial investment was the wrong focus. According to him "the biggest contribution that the private operator can make is improving operational efficiency and service quality". Persistently, multilateral agencies have been blamed for insisting on the promotion of a "one-size-fits-all model". "Public-private partnerships are simply seen "as a 'softer' option for governments to draw a private sector expertise than the more direct strategy of privatising or shifting responsibility for service production to the private sector" (Greve and Hodge, 2007). Marin (2009) maintains that the worst enemy of public utilities is complacency and this problem is rooted in the

assumption that poor service has no consequences and that it is only those public water utilities that have applied sound commercial management principles, emphasising financial viability, accountability and service have succeeded in improving performance.

Presently, evidence emerging from some PPP schemes have re-kindled the debate about the relevance of PPPs in the water supply sector. Variously, public-private partnerships have been criticised on the grounds of poverty aggravation since they are usually perceived to be linked to the objective of cost recovery (Fuest and Haffher, 2007). On the contrary, it is advocated or explained that the basis for involving the private sector is to turnaround poor-performing utilities and bring new expertise, financial resources and a more commercial orientation to bear on them. For instance, (Budds and McGranahan, 2003); (Marin, 2009a); and (Braadbaart, 2002) argue that the main goals intended to be achieved by engaging private operators in the water sector for direct service provision are to improve upon the poor services provided by water utilities and increase efficiency and coverage. Fuest and Haffher, (2007) however consider the involvement of the private sector as a strategy to improve the development of sustainable and efficient water supply systems. “Public-private partnerships offer policy-makers an opportunity to improve the delivery of services and the management of facilities and mobilise private capital” (World Bank, 2009).

On the contrary, the prescription of public-private partnership policies or schemes to most governments of developing countries by the World Bank and other donors, referred to as the new paradigm in the water and sanitation sector, could rather be seen to be stemming from the assumption that the private sector has the ability to undertake capital investments and in addition has the technical and managerial capacity and capability to perform more efficiently and effectively than the public sector. In whatever way one critically looks at the concept or paradigm, it is most likely that one can comfortably provide some justifications for the choice. This is because while “investors say it brings efficiency, opponents say it hurts the poor. Whatever one believes, the poor have no say in the matter” (Akande, 2002).

In most developing countries, public water utilities are beset by widespread illegal connections, high water losses due to obsolete pipe networks, political interference and patronage, financial weakness, poor billing and bill collection, corruption and very weak cost recovery. Ironically, at the confluence of overpopulation, economic deprivation and

environmental degradation, people living in slums occupy a precarious position at the very fringes of urban life" (Ali, 2010). In conclusion, the poor are those who bear the disproportionate share of the negative impact (Fuest and Haffher, 2007). Marin (2009) however believes that the performance of public-private partnership projects in practice depends largely on the action of both the contracting government and the private operator – with the government playing a more or less important role depending on the type of PPP scheme that is adopted, buttressing the point that different PPP schemes will produce different results in different environments in which they operate.

Albeit some PPP projects have brought about appreciable levels of improvements to many people around the world, the concept could not be said to be welcomed and popular among many people and institutions that hold very strong but opposing views and ideologies to it. Therefore, "proposals to involve the private sector have often been met with concerns-about tariff hikes, staff cutbacks, and limited ability to reduce inefficiency and expand access to service among the poor" (Ringskog et al., 2006). While the World Bank and other institutions and individuals strongly argue that the involvement of the private sector in the public services will lead to the creation of efficient markets resulting in economic growth and also directly finance investments leading to quality service and access expansion, its opponents or critics contend that privatisation destroys or damages the quality of public services and undermines public accountability (Cook, and Minogue, 2005). According to Biswas, (2003), as cited by (Mycoo, 2007), "policies promoted and implemented by the International Monetary Fund, the World Bank and other donor agencies have often strangled public authorities and utilities by denying them funding for renewal or extension of infrastructure investment to upgrade their service" and that "the myths of privatisation experience need to be substituted by objective analysis of empirical facts". The implementation of PPP projects in developing countries has attracted further criticism in the pre-contract stages "on account of agreements structured in favour of the contractor, of the neglect of the interests and representation of the poor, the over-emphasis on technical and financial issues, misconceptions about the potential consequences of competition in the public sector and the lack of a base of information about low income groups, often caused by time constraints" (Green, 2003; Hukka and Katko, 2003; Sohail and cotton, 2004 as cited by(Fuest and Haffher, 2007). Nevertheless available information has it that, often, the challenges of the public sector in the provision of water services have been exacerbated when not provoked by public policy decisions (PRINWASS, 2004, as cited by (Mycoo, 2007). Greve and Hodge (2007) strongly argue that "some private

companies might even think of public-private partnerships as a necessary step in order to lure the public sector into sharing some of its authority and expertise, while the long-term aim of the private sector is to take over the business completely". This argument is in line with the interpretation of scholars who see PPPs merely as a rhetoric device that paves way for the more wholesome privatisation and private-sector performance (Linder 1999; Savas, 2000).

From the literature on comparative public management reform "we cannot expect a global convergence around single ideas or concepts" (Christensen and Lægreid, 2001; Pollitt and Bouckaet, 2004 as cited by (Greve and Hodge, 2007). According to Broklehurst and Janssens, (2004), every sector reform must be viewed in the context of the overall environment in the country. Water reforms are sometimes undertaken due to droughts, change of government, poor performance of the water utility, political orientation and will of a particular political party in power, economic challenges due to huge public wage bill, big government spending and uncompetitive economy. Different governments face different challenges in the water and sanitation sector and the level of involvement of the private sector in the public sector depends on the specific challenges confronting the sector at a given time, the prevailing economic conditions, and the political environment in which it occurs. Variations in reform practice from one country to another are the rule rather than the exception (Christensen and Lægreid, 2007). It is said that "reform is most likely to occur when the water sector is in crisis, but only if the causes of the crises are tractable" (Alcazar and Brook-Cowen, (1996) as cited by (Alcazar et al., 2002)). In whichever way one looks at the new paradigm, many of the newcomers (private operators) are now increasingly coming from developing countries and are changing the face of the water market radically which in the 1990s looked like an oligopoly among a few multinationals (Marin, 2009). It is therefore not surprising that many public-private-partnership (PPP) projects have suffered controversy including abrupt contract terminations and reneging on contracts by both the contracting authorities and the private operators since the inception of the concept of public-private participation. In the researcher's view, unless the ideological dichotomy about PPP is fully and carefully moderated, the raging controversies over the involvement of the private sector in the public sector will continue unabated. In trying to have a better understanding of the viability and impact of public-private partnership in the water sector in developing countries it is important to carefully examine these PPP projects.

What is critical in terms of assessing organisational performance is to determine the objectives against which performance should be judged (Nickson and Franceys, 2003). Marin, (2009), emphasises the point that “the debate has sometimes been driven more by ideology than by objective results, and the performance record of many PPP projects has never been scrutinised” and added that lack of data on the populations served and on the quality of services rendered has made it difficult to assess the overall contribution of PPP projects in developing countries. According to Clarke et al., (2004) as cited in Marin, (2009), out of 25 projects studied in developing countries, private participation had a “broadly” positive impact in sixteen cases, a negative impact in five, and mixed results in four. He added that, it is difficult to state that consistently, PPP projects have performed better than public utilities in expanding access. However, their contributions have been significant. For instance, in Brazil, Morocco and Colombia, private concessionaires could not convince or demonstrate that their performance was better than the public utilities based on the data available unlike in the Sub-Saharan Africa, where clearly the performance of the private operator has been better than the public utilities in expanding access through household connections. Furthermore, Marin, (2009), stated that much of the diversity in performance among PPP projects can be traced to differences in financial design and availability for investment and that the assumption that private lenders would be ready to give large amounts of non-recourse project financing to private operators proved unrealistic. He reported that, public financing has been identified as one of the elements in the designs of many successful projects through concessional loan and grants. Cote d’Ivoire presented a special case of a crossbreed between concession and affermages where investments were totally financed through cash-flow generation

2.3 Forms of PPPs in the urban water supply sector

Collaboration between the private sector and public organisations leading to the private operation and management of public utilities comes in various forms depending on the working environment. However, the success of PPP projects or schemes are believed to be contingent upon several conditions including the political environment, socio-cultural characteristics, nature of the legal and regulatory frameworks, level of commitments on the part of both the contracting authority and private operator among other things. Reportedly, the performance of public-private partnership projects in

practice depends largely on the action of both the contracting government and the private contractor – with the government playing a more or less important role depending on the type of public-private partnership scheme that is adopted (Marin, 2009). He however emphasises that different PPP schemes will produce different results in different environments in which they operate. According to Sansom et al. (2003), there may well be 'no correct' answer for water and sanitation institutions and that every country will have to go through a process of determining which process of combination of public private participation approaches best suits their political, socio-economic and water resources environment. But evidently, one challenge that exists in developing countries has been the lack of certainty regarding the most suitable approach to be adapted following a series of highly publicised contract terminations and other controversies in the water sector in developing countries (Marin, 2009).

Generally, different arrangements exist in different forms, sizes and boundaries between public and private sectors and are sometimes blurred, making public-private partnerships difficult to classify and to define clearly (Ouyahia, 2006). The role that the private sector can play in the delivery of services exists in varying degrees (Earle, 2001). As can be seen in figure 2-1, a wide spectrum of forms and sizes of private sector participation exist beginning from service contract (as the simplest form) to a concession contract, depending on varying conditions. What differentiate various options of partnership and participation are the degree of private capital being introduced and the length of the contract required to obtain the necessary pay back and the necessary return on capital (Sansom et al., 2003).

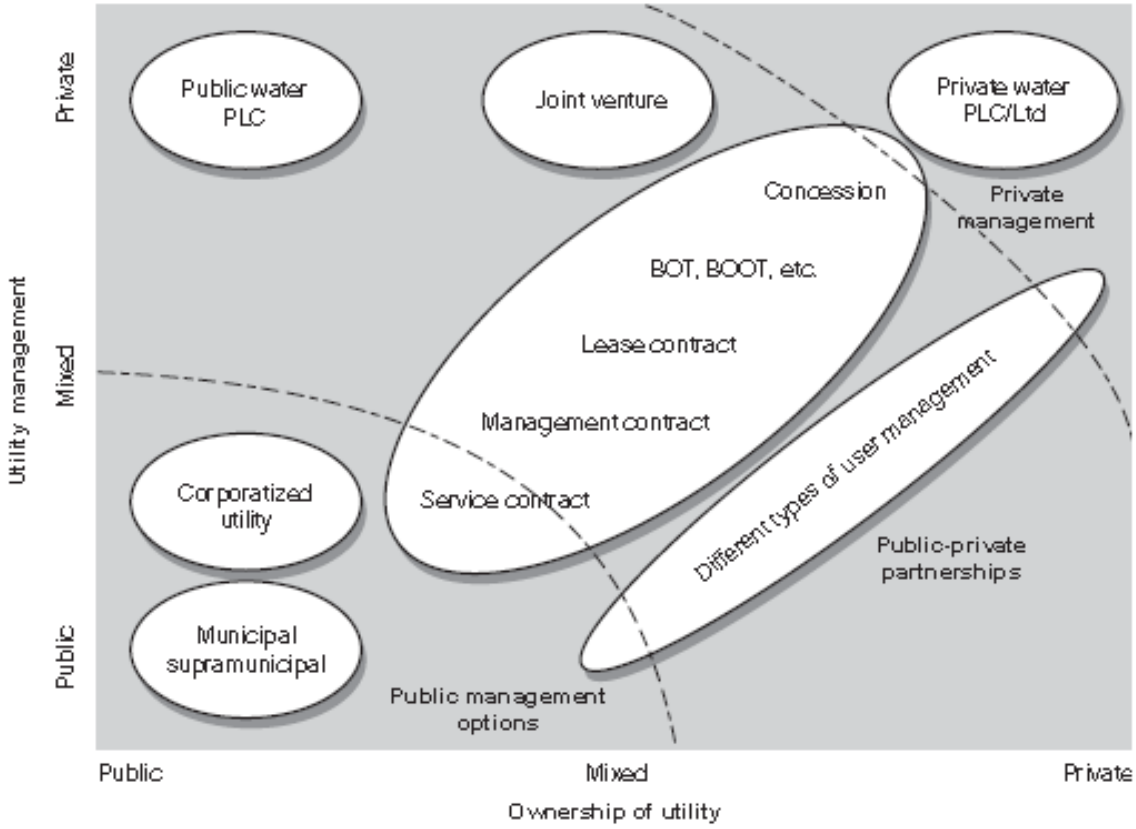


Figure 2-2Different modes of Public Private Partnerships

Source: (Blokland, Braadbaart & Schwartz, 1999) as cited by Franceys, (2007) in a lecture note

Nonetheless, the World Bank, (1995), as cited by (Alcazar et al., 2002), says that a reform becomes politically desirable when the political benefits outweigh the political costs, and feasible when reformers have the power to overcome opposition and implement changes. In Argentina for instance, economic crisis during the period of a reform in the water sector somewhat shaped the political competition and environment which favoured the reform.

2.4 Different modes of management models for water utilities

2.4.1 Service contract

The simplest form of partnership among all other forms of private sector participation arrangements is the service contract. With a service contract, overall responsibility for

the system is retained by the public authority and only some specific components of the overall service are contracted out to the private operator to bring about economic and financial efficiency. In such an arrangement, the private operator or contractor is limited to handling its own staff and the service component contracted out to it to provide efficient service. Usually, the contract period lasts between one to three years (Sansom, et al., 2003). And given the limited period and narrowly defined nature of service contracts, competitive bidding procedures can easily be used to award service contracts (Asian Development Bank, 2008).

In the water sector, services such as meter reading, billing, repairs of pipelines and other plumbing works are within the domain of service contracts spanning between one to three years as in the case of Mexico City; Santiago, Chile; and Madras, India. Often, service contracts are portrayed as a stepping stone to management contracts, leases or concessions, and do not necessarily create circumstances that make further reform likely (Haggarty et al., 2002).

In Mexico, there were two features worthy of note regarding the service contract employed. First, four contractors were engaged and second, each contract was designed to be executed in three stages over a ten-year contract period. This arrangement reveals something about the use of multiple private partners and progressive step processes to increase the benefits and sustainability of private sector reforms in water sector over time. Here, the possible benefits to be derived from such a model or approach were that, competition could be enhanced among individual operators to generate efficiency. Furthermore, it was presumed to allow governments to gradually introduce the private operators to the public to fend off the usual public opposition and encumbrances that are often associated with public-private partnership projects (Haggarty et al., 2002). Politicians appear to appreciate this type of model where difficult decisions in the implementation of such plans are often left to the later years so as to push potentially unpopular actions onto future administrations while allowing the current government to claim credit for instituting reforms (Brook, (1997) as cited by (Shirley, 2002)).

2.4.1 Management contracts

Marin, (2009) defines a management contract as an arrangement in which services are provided by a publicly owned utility that is managed by a private operator. In a broader

term, it is an arrangement under which operational control of an enterprise is vested by contract in a separate enterprise which performs the necessary managerial functions for a fee in return (The Water and Sanitation Monitoring Platform (WSMP) - Ghana, (2009). Unlike service contracts, the private operator is granted more responsibility to manage several components of the services under management contracts including operation and maintenance of the distribution system. Typically, the contract periods span between 3 and 5 years as in the case of Cartagena, Mozambique, Trinidad & Tobago, Uganda, Gaza, Colombia; Gdansk, Poland; Mali; and Johannesburg, South Africa among others (Marin, 2009). Distinctively, the private operator offers services only while the public authority provides the working and investment capital and shapes issues regarding cost recovery to ensure the financial viability and sustainability of the utility. Nonetheless, separating the service and management functions from financing and expansion decisions makes the overall governance more complicated and therefore sometimes introduces the risk of the private operator not enjoying the needed autonomy or the authority to overhaul under-performing capital investments.

A management contract might be chosen as a means of improving operational efficiency in a mature water and sanitation utility where there is no need for substantial new investment, or where there is limited political support for moving towards lease arrangements in which a private operator takes on the commercial risk (Marin, 2009). Normally, governments employ management contracts first to test the waters (- i.e. adopt a stepwise approach towards a long-term leasing or concession contracts) as in the case of Trinidad and Tobago, and Gaza. Evidently, in practice, none of these management contracts led to a more complex public-private partnership. The point must be made that this model or arrangement may not be suitable for governments that expect to access credit or private finance for new investments since the private operator will not make any capital investments.

Nonetheless, one major advantage of a management contract is that several operational gains could be made through the private sector management without having to transfer the assets of the public utility to the private operator or investor. Management contracts are relatively less difficult to develop than others and can be less controversial as well as being lower cost (Asian Development Bank, 2008).

2.4.2 Example: Management Contract in Gaza

According the World Bank, (2006), by 1995, the water supply services in the Gaza Strip were in a crisis. The water utility was confronted by;

i. intermittent water supply services
ii. over extraction of its primary water resource
iii. poor water quality due to the intrusion of deeper saline water
iii. high levels of unaccounted for water of about 50 percent
iv. leakages in distribution networks
v. low tariffs - well below cost recovery (i.e. US$0.30 - US$0.40).
vi. illegal connections, and
vii. inaccurate or no metering.

Consequently, the Palestinian Authority entered into a four-year management contract with Lyonnaise des Eaux/Khatib and Alami (LEKA) so as to improve water supply services in the West Bank. Technically, there were no clear legal and regulatory frameworks. Not only that but also, there was scanty information on the water utility and its network system. Furthermore, the Palestinian Authority was faced with political and security challenges in the Gaza (Saghir et al, 1999). However, one essential feature of the arrangement that is worthy of note was the use of a reputable international audit firm to provide an independent assessment of the performance of the operator and overcome any potential tension(s) that might arise between the private operator and the Palestinian Authorities in view of the fact that there were no clear regulatory framework. Again, the arrangement offered several opportunities in view of the fact that the contract was flexible to the extent that the private operator was allowed to determine immediate investment needs and also procure goods and services whenever necessary (World Bank, 2006). Furthermore, it allowed the contracting authority and customers to make informed choices and judgements based on the performance of the private operator.

According to the World Bank, (2006), the operator successfully met the requirements of the contract terms under its direct authority but the local authorities displayed inconsistencies in implementing their responsibilities. For instance, the Palestinian Authority failed to deal with nearly 11,000 illegal connections identified and reported and were also reluctant to deal with staff in the dosing units who failed to follow

technical and operational instructions (Saghir et al., 1999). They added that leaving the “implementation of management decisions in the hands of the local authorities” was a major defect of the arrangement and thus greatly exposed some of the major limitations of management contract that negatively impacted on the benefits of improved management. Meanwhile, the project improved the per capita water consumption from 70 to 100 litres per day by 2001. In addition it improved the water quality, and the unaccounted-for water reduced from 50% to 30%. Finally the revenue also improved.

2.4.3 Example: Management Contract in Trinidad and Tobago

Evidently, the public water utility, the Water and Sewerage Authority -WASA was poorly operated and managed and this led to the engagement of the private operator in the water sector in Trinidad and Tobago, (Weatherdon, G. as cited in Sansom, K. 2003). The utility had a malfunctioning water supply and distribution system and went bankrupt. The Water and Sewerage Authority (WASA) of Trinidad and Tobago suffered similar challenges that many publicly-owned utilities in low income countries face including;

i. high unaccounted-for water,
ii. low service coverage,
iii. low productivity,
iv. corruption,
v. financial bankruptcy,
vi. political patronage and interference,
vii. non-metering,
viii. very low water tariffs,
ix. lack of capital for infrastructural development and capacity building and
x. low collection efficiency (Mycoo, 2007; Nankani, 1997).

In addition to the above challenges, there was no well-defined or planned programme for rehabilitating old distribution pipelines and pipe repair techniques were inadequate. This led to high levels of unaccounted-for water and frequent interruptions in water supply. Due to the level of bankruptcy, the water utility could hardly float bonds or raise commercial loans (Mycoo, 2007). Apparently, water tariff levels remained unchanged over four decades (i.e. from 1937 to 1985) for political expediency. Strangely, more

than half of the funds granted to WASA for capital development were used in taking care of daily cash requirements. This further led to the erosion of the asset base of the utility, deterioration of physical plants and rampant water rationing. Even though, it required a policy reform to address the operational, maintenance and investment challenges confronting the bankrupt public water utility, the government opted for privatisation in 1996 using an interim management contract with Severn Trent Water International of the United Kingdom" (Mycoo, 2007). A two-phase strategy was adopted with the primary objective of giving the government of Trinidad and Tobago ample time to:

i. gather information for better risk allocation in the future,
ii. develop a long-term tariff regime, and
iii. establish a relationship of trust with a private operator and at the same time improving service employing private sector management (Nankani, 1997).

Fundamentally, the loan contracted from the World Bank was to help undertake major maintenance activities on the water network system, increase access, improve billing and collection and install more meters based on performance targets set in the arrangement. Meanwhile, with the private sector involvement in a water sector with limited regulatory capacity, the approach adopted by Government could best be described as the safest. Apparently, it was politically unwise and disadvantageous for the incumbent government of Trinidad and Tobago to undertake a long-term, 30-year concession without first testing the 'political pulse' of the general population with a short- term agreement and partly because, "it would require the time-consuming task of amending the company's authorisation act in the months preceding a general election in November 1995", hence the management contract was chosen (Nankani, 1997).

One major challenge of this arrangement that resulted in poor outcomes was the failure of the Government to set up a strong and comprehensive regulatory framework to regulate the activities of the private operator (Manson, 1994 as cited by (Mycoo, 2007). Additionally, the autonomy of Water and Sewerage Authority, (WASA) was severely compromised through government's interference and political manoeuvring. Critical measures that needed to be adopted to improve the efficiency of the utility such as strict financial accounting, cost recovery and programming of investment fell victim to government actions (Mycoo, 2007). In the end, the performance of the private operator

was judged unsatisfactory to the Trinidad government and therefore the contract was not renewed upon expiry.

2.4.4 Example: Management contract in Mozambique

In 1999, the Government of Mozambique created an asset management agency (FIPAG) to develop and improve the urban water supply services in the large cities after the protracted war in 1992. Two separate but bundled arrangements of a 15-year lease and management contracts were signed with Agua de Mozambique (AdeM) – (formed through a consortium of foreign water supply operators led by SAUR, and some local investors). A comprehensive institutional reform was undertaken by developing an institutional framework, referred to as the Delegated Management Framework (DMF). The framework created two autonomous public bodies including an independent regulatory body (CRA) and an asset management agency (FIPAG) to facilitate the smooth implementation of the entire reform in the water sector (Triche et al., 2009). According to Triche et al., (2009), several factors influenced government's decision to adopt this form of contracting by awarding two separate but bundled contracts which included "the existing decentralized market structure, the government's policy to promote the development of financially viable decentralized services, and the expectation that services in the provincial capitals would probably not attract qualified bidders unless bundled".

Overall, the selection of the successful bidder (AdeM) was based on technical and financial proposal. Albeit the financial bid was unrealistically low AdeM won the contract and two years into the project in 2001 it began facing major financial difficulties worsened by delays in the implementation of new investments and floods in 2000. Ultimately, it culminated in the renegotiation of the contracts where higher fees, improved service obligations and risk allocations and procedures were introduced.

2.4.5 Management Contract critique

The management contract itself is a legal document which explains in performance requirements in detail and spells out the terms of relationships among all relevant stakeholders or parties including the private operator, the asset-holding authority, the regulator if any, and customers in the relevant water sector. It constitutes the foundation around which all future activities and conflicts are revolved. The document

requires clear definitions of all legal, financial, technical/operational, regulatory, institutional and social boundaries to ensure efficient, transparent, effective and successful contract implementation. Marin (2009) maintains that details do matter; the choice of contractual designs, as well as the willingness of the public and private partners to make the contract work during the implementation. And according to him, these factors have proved to be major determinants in the final outcome.

In the case of Gaza and Trinidad & Tobago, the designs were such that the contract fee was composed of a fixed payment/fee component (i.e. fixed management fee) and a performance fee component that was contingent upon specific performance targets set in the agreement for the private operator. In Gaza, a fixed-fee component of US$6 million formed the basis for international competitive bidding for the management contract with an incentive payment of US$3 million which had an annual ceiling of a quarter of the total incentive payments (US$750,000). Here, the contract arrangement demanded that the private operator provide full-time expatriate managers, full-time local technicians, administrative support, and short-term expatriate specialists to undertake certain specific tasks. Technically, all performance targets were grouped under four contract objectives and rated to reflect the priority of all targets with the reduction of unaccounted-for water being the most prioritised. Incentive payments were therefore made employing composite performance scores. Meanwhile, one significant feature of the agreement is worthy of note. Because there existed no regulatory body prior to the contract, the contracting authority engaged a private auditing firm (Deloitte and Touche, Norway) which was mandated to audit annual technical/operational and financial performance targets and determine incentive fees, if any, and finally to undertake comfort letters for any payments to be effected. What is unclear is whether or not the auditing firm could effectively monitor and assess the performance of the private operator knowing that, irrespective of who owned the water utility, “there is always a strong asymmetry of information between the regulator and operator” and sometimes the “private operators can abuse their monopoly position to extract undue and excessive profits”(Marin, 2009). Obviously, this form of the contract arrangement raises a major question about whether it could not have been more appropriate to establish a local but independent regulatory body that was legally mandated to oversee all sector activities including tariff-setting instead of simply engaging an auditing firm that was only reviewing the operator’s annual performance reports.

Furthermore, other lessons that could be drawn from this arrangement are:

- the high level of financial support provided to the project by the World Bank for infrastructural development and
- the network rehabilitations and system expansion helped in reducing unaccounted-for water, increased water coverage and per capita consumption.
- clear benchmarks and performance ratings were set
- the contract permitted the operator to focus on benchmarks that could promote higher performance

Consequently, staff training and public relations were given less attention because these benchmarks were perceived as harder to achieve or worth too little in terms of their weighted worth" (Saghir et al., 1999). However he stated that, one way of overcoming such challenges is to design the contract in such a way that some objectives form part of the contractual requirements either within the base or the incentive fees, and to be monitored effectively (Saghir et al., 1999). To reform the water and sanitation sector in Trinidad and Tobago, certain initiatives were taken by the government to improve the economic viability of the public water utility. According to (Mycoo, 2007), a tariff increase was swiftly granted prior to the engagement of the private contractor thereby prividing the opportunity to be insulated from the usual unwarranted agitation, accusation and wrath of the general public and other civil society groups against the private operator for the tariff increases upon resumption. In addition, the water utility was granted the right to increase water tariff of customers enjoying more than a 12-hour water supply service by 35%. Meanwhile, political interference and inordinate delays in processing tariff increases applications resulted in infrequent price changes (Mycoo, 2007). Similarly in Guyana, the management contract began in January, 2003 and a tariff increase of 37% was granted by the Government in March, 2003. In spite of this, the private operator was associated with the tariff increase and wrongly accused by its customers for the increase in tariff even though it was implemented before the inception of the contract. Technically, albeit the link might be justified at first glance, "in reality, the water utility was bankrupt", where "tariff revenues did not cover operating and maintenance costs, or even the electricity bill from the state electricity utility" (Marin, 2009). Also, to the private operator, it serves as an incentive for the generation of more revenue that will eventually lead to financial viability of the water utility, coverage expansion and finally provide reliable water supply services to its customers. In the case of Guyana, all bidders were asked to submit technical, financial and supplementary proposals separately to ensure that "it obtained

not only good financial bids, but also technically competent management teams" and to test the appetite of the private sector for risk in the water sector (Nankani, 1997).

2.5 Complex Public Private Partnerships

2.5.1 Lease contract or Affermage

Returning to the investigation of different types of PPP arrangements under lease contracts, facilities are rented to the private operators by public authorities between 8 to 15 years duration. The private operator completely assumes responsibility for the operation and management of the entire water system including the collection of water tariffs. International examples of leases, particularly common in France from where most of the initial private operators originated took place in Cote d'Ivoire; Guinea; and Czech Republic. Unlike the service and management contracts the lease models commit and empower the private operator to provide the working capital while the grantor provides the investment capital. The lessor or private operator effectively buys the rights to the income stream from the utility's operations and thus assumes a significant share of the commercial risk associated with those operations (Sansom, et al., 2003). The main advantage of lease contact is that, it is more attractive to private operators, who might otherwise be reluctant to get involved in risky environments.

2.5.2 Build Operate and Transfer (BOT) contracts

A Build Operate Transfer (BOT) contract involves a concession firm or a consortium of firms providing the financial investment, designing, constructing, operating and maintaining the infrastructure for an agreed but specific period before transferring the facility to the government as in Mendoza, Argentina; Izmit, Turkey. Generally, build-operate and transfer projects in the water sector have mostly been limited to the Latin America, East Asia and the Caribbean. It is capital intensive and therefore mostly identified with new water projects that require heavy investments. BOT contract period lasts longer than lease period (usually more than 20 years) to ensure that the project is bankable before transferring the facility to the public authority or government.

2.5.3 Concession contracts

Baxter et al. (2010) describe a concession as a private business operated on another's property by contract or permit and governed by state, federal, and local laws, which vary by jurisdiction. Under a concession arrangement, aside from the responsibility of the private contractor to operate and manage the assets of the water utility, the contractor also provides the investment. In this arrangement, the asset is under the contractor's ownership but all assets revert to the government after the contract period (usually for 25 and 30years), including asserts created by the private operator as in the case of Buenos Aires, Argentina; Manilla, Philippines; and Cancun, Mexico . Concessions are awarded through competitive bidding. The bidder that proposes to operate the utility and meets the investment targets usually for the lowest average tariff wins the concession and is governed by a contract that sets out such conditions as the main performance targets.

2.5.4 Examples: concession contracts

In order to understand the particular qualities and role of the management contract, it is useful to consider in more detail aspects of the more sophisticated and complex concession contracts. Examples from Buenos Aires, Argentina and Senegal are described.

Despite the enormous volume of water resources available in Buenos Aires, as a result of poor management and policies of governments in Argentina, water was made very scarce. In its suburban areas where the poor were predominant, only 55% of inhabitants had water. Also, only about 1% of consumption was metered, billing was poor, collection efficiency was about 80% and water coverage was 70% in the metropolitan. Consequently, the water sector became well ripe for private participation leading to one of the largest concessions that the world saw in a developing country since December, 1992 (Alcazar et al., 2002). According to Ducci, (2007) as cited by (Marin, 2009), the concession in Greater Buenos Aires served a third of the urban population of the country and saw a substantial investment during the first five years. Even though Delfino et al., (2007) state that after 1997 the concessionaire failed to invest in network expansion to reach the neighbourhoods further away in the periphery, overall, the concession in 1992 brought about major improvements in the sector that were considered “striking” in spite of all the criticisms it attracted at the time.

However, the concessionaire's failure to investment in the early years of the project in network expansion sharply brings into question the role of the private sector in funding water projects. Meanwhile, in some other jurisdictions, PPP projects performed well in expanding access to piped water as in the cases of Senegal, Cote d'Ivoire, East Manila (Philippines), Guayaquil (Ecuador) Cartagena (Colombia) and Corrientes (Argentina).

Similarly, Senegal's urban water supply sector underwent a major reform after the public utility became bankrupt. The utility was also plagued with a lot of problems such as; lack of autonomy from government, chronic water shortages in the capital city and piecemeal development of the asset and unpaid bills with clients in the public sector (government departments, municipalities and parastatals),. Consequently, the government engaged a French water company on a 10-year contractual basis to run the production and distribution systems of the urban water utility with a major objective establishing long-term financial viability through increased efficiency and effectiveness so as to rescue the bankrupt urban water supply sector. According to Brockhurst and Janssens, (2004), the in Senegal saw a lot of improvement by the seventh year and is perceived to be an example of a well-planned and well-executed reform. One major factor that contributed to the success of this arrangement was the effective and efficient contract design processes that were employed. Here, a great emphasis was placed on learning from experiences of other transactions and reform processes within other jurisdictions. Comparisons were made using the case of Guinea, The Gambia and Cote d'Ivoire. Finally, the institutional framework for the water sector was:

- transparent
- driven by three basic concepts: accountability, autonomy, and incentives.
- attract a professional private operator
- co-ordinated centrally by an experienced and asset owner (State Asset Holding Company)
- not overly regulated with too many conditions placed on the actors
- and ensure that the partners cooperated and maximised joint benefits (asset-holding authority and private operator) (Brockhurst and Janssens, 2004).

Furthermore, it was emphasised that a sound balance should exist between the operator and the asset-holding company stating that: "if the arrangement creates a giant and a dwarf, the outcome will be that the giant will dictate to the dwarf". As they

put it in the report, even a solid contract will not prevent overruling if there is not balance of power (Brockhurst and Janssens, 2004).

More significant of this arrangement was the bidding process. Here, request for proposals were widely publicised in order to attract a good number of companies from different countries and the government officials visited several countries to stimulate interest in the bidding process including England, Germany, Belgium and the United States of America as a follow up. According to Brockhurst and Janssens (2004), nine years after the initiation of the reform, the Senegalese urban water sector saw major improvements in service levels. It is significant state that these successes were chalked due to the good working relationship that existed among all sector players. Finally, the utility showed its capability of borrowing funds from the capital markets and repaying them in a timely manner. According to Brockhurst and Janssens, (2004), the reform process made the urban water sector reform in Senegal successful because of;

- the use of a particularly appropriate form of contract
- strong political will of government and good leadership within government
- a well-designed process and
- the flexibility and innovation on the part all sector actors whenever necessary

Overall, the experience of water reform in Senegal reveals that:

- there can be no sustainable and successful reform if there are no political commitments, strong internal leadership and stakeholder ownership
- Governments must show commitments towards its investment obligations and ensure timely implementation
- Sector investment must be planned in parallel or in synergy with utility reform
- Trust and cooperation among all key sector players are crucial
- The asset-holding company needs to be institutionally autonomous, professionally competent and with a clear financial and operational targets
- Issues regarding staffing must be addressed upfront and if necessary staff cutbacks are effected

2.6.1 Impact of public-private partnerships on tariff levels

One major reason why private operators have never been welcomed into the water sector by consumers has been the fear of increase in tariffs. The private operator is perceived to be profit-oriented or motivated albeit the assertion may not be wholly true for the private operator. Marin, (2009) identified three major factors that affect tariff levels whenever a private operator is engaged including:

- the tariff policy adopted by the government under the PPP project, which determines how much of the cost will be financed through tariff revenues
- the difference between the tariffs and cost recovery levels before the start of the project and
- the level of cost reduction the private operator can achieve through efficiency savings

According to him, universally, the task of evaluating tariff records of PPP schemes could sometimes be herculean and controversial taking into account the last two factors above and how they combine within the context of the developing world. Even though the impact of PPP projects on tariffs could be evaluated by comparing water tariff levels under public and private utilities, it must be done with caution since it is usually uncommon to have both schemes operating under the same framework (Marin, 2009). It is therefore significant to compare parameters that are comparable under the same or similar conditions. From the extensive study undertaken by Gassner et al., (2009) using very large samples of utilities and comparing corporatized utilities with public-private partnership schemes, no significant impact of PPPs on tariff levels during either the transition or the post-PSP period, for any type of PSP contract investigated was found. Also, (Estache and Rossi, 2002) and (Andres et al., 2006) could hardly establish any effect of privatisation on prices. (Gassner et al., 2009) assigns two reasons for such results along the lines of theoretical predictions. They are;

- a reduction in price due to an improvement in efficiency and
- an increase in price due to the elimination of explicit and implicit subsidies and cross-subsidies often present in the sectors analyzed.

Between the effects, the one that will dominate depends on the initial situation and the regulatory environment they added.

The sensitivity of tariffs and the need to understand the actual costs incurred by private operators leads to a consideration of PPP's corollary, economic regulation.

2.5.2 Economic regulation in the water sector

Fundamentally, “market failure” provokes the introduction and application of economic regulation to mitigate distortions associated with monopoly prices in cases where there are barriers to entry and should provide the right investment incentives to market participants and protect consumers from monopoly abuse (van Ginneken and Kingdom, 2008; van Basten, 2007; and (Guasch J.L. and Spiller, 1999). Usually, utilities with natural monopolies operate in market failure conditions, where producers could abuse market power and consumers would be unable to make alternative choices due to lack of information and competition (Aryeetey and Ahene, 2005). In such a situation, the tendency of service providers to overcharge and consumers to underpay will generate mistrust. In this regard, the role of an independent regulator as a “referee” can therefore not be overemphasised. Often, economic regulation is associated with private sector participation in the provision of water supply and sanitation services (Locussol et al., 2009). According to Trémolet and Hunt, (2006), regulation is a set of functions that consists of:

- ensuring that service providers comply with existing rules (mainly on tariffs and quality standards) and
- adapting those rules to cope with unforeseen events

Regulation exists in various forms that may sometimes be overlapping but comes under three common classifications such as; economic regulation, social regulation and process regulation. Nevertheless, this research is particularly concerned with economic regulation. Conceptually, different authors and institutions have given different descriptions and definitions to the term “economic regulation”. According to (Guasch J.L. and Spiller, 1999), economic regulation is the “restrictions on prices, quantity, and entrance and exit conditions for specific industries” with the fundamental economic rationale of improving production efficiency and entails monitoring, enforcing and changing allowed tariffs and service standards so as to avoid monopoly abuse of service providers that may provide poor services and charge tariffs that are above

costs in order to increase their profits. In a more simpler and elaborate form, Gerlach and Franceys (2008) refer to economic regulation as “the process of acting as an ‘impartial referee’, balancing, judging, adjudicating and refereeing the various stakeholders interests, not the writing of ‘regulations”. Knowing the critical role of a referee explains vividly the role and the relevance of economic regulation in PPPs. In its broadest sense, regulation is the imposition of rules by government, backed by the use of penalties that are intended specifically to modify the economic behaviour of individuals and firms in the private sector (OECD, 2007). Clearly, the few definitions stated above have provided various economic and social reasons for the regulatory functions of a regulator but the commonest among these reasons are based on “correcting for market failure, economies of scale or equity considerations” (Guasch J.L. and Spiller, 1999and OFWAT, 1999).

Till date, it is unclear to many what specifically the benefits of regulation are and sometimes raise the argument about what form it should take. While one school of thought says that every regulation requires a regulator and that regulation by contract is not possible and thus simply define regulation as “whatever the regulator does”, the other considers regulation to mean “almost any form of government control of the water sector and assume it to be the answer to any water sector problem” (Groom et al., 2006). Groom et al., (2006), strongly disagree with the assertion that regulation is just “what regulators do” and argue that regulation means more than that. Regulation could be done by either contract or by a regulator. Meanwhile, it is generally useless to impose a regulator on a management contract since incentives to improve performance are embedded in the contract (Locussol et al., (2009). “Regulation can only complement ownership, not replace it” (Groom et al., 2006).

Globally, public-private partnership in water supply sector is at risk in environments where there is weak regulatory capacity (Fuest and Haffher, 2007). It is fair and appropriate to indicate that regulation is fundamental to governing complex, open and diverse societies and economics (Rodrigo, 2005). In agreement, Ugaz and Price, (2003), argue that some regulation is necessary to prevent exploitation of monopoly profit by industries that retain a degree of monopoly power. Also, regulation is appropriate because welfare objectives of governments and private operators are not the same, with operators having information advantage over governments (information asymmetry), and also having market power and without it, private providers might make unreasonable profits by overcharging and under-delivering (Jamison and Berg,

2008; Ehrhardt et al., 2007). Regulatory institutions are therefore required to oversee and ensure competition, efficiency, affordable pricing and quality service (Aryeetey and Ahene, 2005; Berg, 2000; Mandri-Perrott, 2009)().

Meanwhile, Groom et al., (2006) as cited by van Ginneken and Kingdom, (2008) claim that independent regulation of public utilities has often failed to deliver the expected outcomes because it lacks the ability to apply sanctions and therefore effective regulation will require the ability to reward good performance and punish poor performance. They emphasised the point that "a refusal of a regulator to grant a tariff increase to a privately owned utility due to an assessment of inefficiency can move the private owners of the utility into action by threatening their profits. If the regulator punishes a publicly owned utility for inefficient performance by refusing it a tariff increase the government owner will likely cover this deficit through taxes or a cut back on expenditure. In either case the public suffers". In this regard, the researcher argues that the goal of an effective regulation hitches on financial viability, operational efficiency, distributive justice and dynamic efficiency. Here, financial viability relates to the creation of incentives towards cost recovery and at the same time offering quality services, operational efficiency ensures appropriate pricing to "optimise consumption and supply" while dynamic efficiency rivets on ensuring competition and expand services and finally, redistributive justice deals with the social objectives of universal services such as subsidies to take care of the poor (Mandri-Perrott, 2009). Considering regulation as an art therefore implies that knowing the objectives of regulation is one thing and having the ability to effectively and efficiently regulate in order to achieve the set goals and objectives is another. Berg, (2000), buttresses this position by stating that, part of the art of regulation revolves around understanding the linkages between choice of market structure, design of regulatory rules, and institutional requirements. Now, the ability to balance the interests of the three major sector actors; customers, investors and government constitutes the major task of regulation (van Basten, 2007 and Mandri-Perrott, 2009). It must however be pointed out that, the success or failure of any regulation is contingent upon how it is designed and implemented, and the specific problem it is attempting to solve (Guasch and Spiller, 1999). It is therefore significant to design the systems of governance and develop the regulatory rules to support the objectives of improving the sector performance (Berg, 2000). Bad design of agreements has often accounted for the failure of agreements and a good agreement is "simple and short" and specifies (van Ginneken and Kingdom, 2008):

Guasch J.L. and Spiller, (1999) consider the underlisted regulatory elements as vital for effective and successful regulation

- Regulatory credibility
- Clear rules for and limits to government and regulator discretion
- Minimum opportunities for renegotiation
- Maximum use of competition wherever feasible
- An incentive-based regulatory framework
- Appropriate antitrust legislation, well-trained and well-compensated professionals, and effective enforcement.

Often, regulatory institutions in developing countries are weak with limited regulatory capacity. In certain situations, it is extremely difficult for regulatory institutions to attract qualified staff or professionals to undertake efficient and effective regulatory tasks due to poor remunerations and over-politicisation of the institutions. Consequently, many regulatory institutions in developing countries could hardly be described as sufficiently independent of governments' control and cannot effectively enforce the regulatory frameworks and thus poses a major challenge to the success of most reforms undertaken in developing countries within the public sector (Guasch J.L. and Spiller, 1999).

2.5.3 Challenges of Economic Regulation

In Ghana, regulation of water and electricity utilities has repeatedly suffered from political interference and patronage. These have greatly impeded the general performance of both the regulator and the utility companies to the extent that Ghana Water and Sewerage Corporation could only increase water tariffs upon ministerial approval which in most cases delay for several months and in some cases, more than a year (Amis, 1998). The question then is why would the government of Ghana interfere in the activities of regulators and yet continue to trumpet the mantra of regulation? According to Aryeetey and Ahene, (2005), the initial imposition of measures to promote regulation and competition in economic activities in Ghana, including utility services, was not necessarily out of a public conviction about the benefits of the principles of regulation, as in the attainment of social objectives but out of a sense of compulsion. While on the one hand some governments accept the general principles of private sector as a panacea for the inefficiencies of public utilities including lack of

quality service, poor management, lack of investment in public utilities and under-pricing, on the other hand, they exhibit their failure to play by the rules of the game most of the time. Regulatory independence is very much compromised in most developing countries through political interference. In Zambia for instance, a regulator was dismissed for approving a price increase that was considered politically unpopular although the increase was required by law (Jamison and Berg, 2008). In the United States, regulators sometimes lose their jobs if they are seen by politicians to be outspoken or too politically active. In effect, politicians may use regulators as scapegoats for ineffective or unpopular policies or for policies that are difficult to explain to the public he added. Regulatory independence requires that the regulator and the regulatory body enjoy arm's-length relationships with the consumers, private interests and political authorities (Smith, 1997).

Regulation and competition in developing countries are often hampered by several factors making reforms difficult to attain the needed levels of effectiveness and efficiency. The factors listed below underscore some of the regulatory challenges in the water sector (Laffont, 2004):

- Lack of up-to-date technology such as computerised systems.
- Lack of proper training programmes; to the political and social difficulties that hamper the payment of incentive salaries to auditors to reward effort and discourage corruption.
- Widespread corruption
- Inability to impose high penalties in cases of documented wrongdoing
- Weak accounting and auditing systems
- Lack of constitutional control of government and some degree of inability to enter into long-term contracts.
- Lack of checks and balances typical of well-functioning democracies (supreme courts, government auditing bodies, separation of powers, independent media) make the governments an easier prey to interest groups and patronage.
- Weakness of rule of law
- Poor enforcement of laws and contracts biases contracting toward self-enforcing contracts or leads to renegotiations.
- The failure of liberalisation and deregulation of public infrastructure to attract the necessary level of foreign capital and

- Lack of political democracy and well-functioning political institution increase the uncertainty of future regulations and make it difficult for government and regulatory institutions to make credible commitments to long-term policies.

According to van Basten, (2007), “in the African context true independence remains the long-goal, but in practice government and utility regulators are closer than what might ideally be required”. Economic regulation is clearly a sophisticated approach to governance which cannot necessarily be assumed to function effectively in limited governance capacity environment. Coherence, predictability, credibility, legitimacy and accountability are key attributes of a good regulatory system (Ehrhardt et al., 2007).

2.5.3 The role of the regulator in urban water supply sector in Ghana

One major step taken by the government of Ghana to exhibit its commitment and support for the water sector, to ensure fairness among all stakeholders in the sector, was to establish an economic regulator. This was also believed to facilitate increased private sector participation in the water and electricity sectors. The Public Utilities Regulatory Commission (PURC) was set up in October 1997, under Act 538, to regulate the provision of utility services in the water and electricity sectors with the mandate to:

- promote guidelines for rates to be charged by utility service providers;
- protect the interest of both the service providers and consumers;
- promote fair competition among public utilities;
- examine and approve rates to be charged by service providers; and
- monitor and enforce standards of performance for provision of utility services.

Regulatory supervision of a monopoly is not necessarily political. What it requires is a combination of social, technical, economic, financial, accounting and commercial know-how (Halcrow, 1995). Technically, its functions complement the role of the State Enterprise Commission (SEC) which regulates all State-Owned Enterprises, with the Water Resources Commission (WRC) regulating and managing all water resources in the country (PURC, 1998). But until the establishment of the Public Utilities Regulatory Commission in 1997, Government was both the regulator and the operator. Its mission

statement states that "*PURC is committed to the development and delivery of the highest quality of utility services to all customers and potential customers, while building a credible regulatory regime that will respond adequately to stakeholders' concerns and also ensure fairness, transparency, reliability and equity in the provision of utility services in the Country*" (PURC, 2005). However, despite section 4 of Act 538 which set-up the PURC making it independent and autonomous, its activities are criticised for not being autonomous as will be investigated further. Undue political interference and patronage had greatly impeded the general performance of the water service provider, to the extent that GWSC could only increase water tariffs upon ministerial approval which in most cases delayed rises for several months and in some cases, several years(Amis, 1998). Consistently, since the inception of multi-party democracy in Ghana in 1992, governments hardly ever allowed tariff increases in election years since the incumbent party would not like to loose votes due to tariff increases. In view of the foregoing challenges, there could well be weaknesses in the regulatory system that are likely to work against the arrangement with the management contractor to the extent that the regulator (PURC) remains dependent on government. According to the World Bank, (1994), "given the limited regulatory capacity of most African countries, divestiture of public utility management poses special challenges. As the ultimate owner, the state will have to continue to set service goals, cost minimisation targets, and investment incentives. Designing good contracts and monitoring the implementation require sophisticated institutional capacity. This will be difficult in the African context, but is unlikely to be any tougher than regulating a government-owned utility".

2.6 Water as an "Economic" or "Social" good

People living in low-income countries have continued to suffer from diseases and sicknesses associated with poor water supply and sanitation. In 2003, the estimated 1.6 million deaths per year were attributable to unsafe water supply and sanitation, including lack of hygiene (Hutton and Haller, 2004). Access to clean water is key to survival and critical for reducing the prevalence of many water-related diseases (Gleick et. al., 2002). Access to water is fundamental to development and therefore any attempt by governments of developing countries to reduce poverty and promote economic growth should first address issues regarding access to improved water

supply and other related services which are critical and crucial. Meanwhile, misuse and scarcity of fresh water are frequently reported around the globe pointing to a very gloomy picture of how unsustainable the world's water resources are becoming in future. Unless the water resources are effectively and efficiently managed, human health, food security, industrial development and the ecosystem will be at risk since they all depend on water. In 1992, the global water challenge attracted the attention of experts, practitioners, governments, and organisations around the world giving birth to the International Conference on Water and Environment (ICWE) in Dublin in 1992. Consequently, the provision of water services around the world has generated a controversial debate as to how water should be considered following the four Dublin principles declaration in 1992 stating that:

- Water is a finite, vulnerable and essential resource which should be managed in an integrated manner.
- Water resources development and management should be based on a participatory approach, involving all relevant stakeholders.
- Women play a central role in the provision, management and safe guarding of water.
- Water has an economic value and should be recognized as an economic good, taking into account affordability and equity criteria.

(Source: ICWE, (1992) as cited in Savenije and Van der Zaag, (2002))

For many centuries before 1992, water was recognised as an economic good (Rogers et al., (2002). Meanwhile, between the concept of water pricing and the idea of water provision being a basic right to all individuals, a conflict may exist if water prices rise to a level that low-income households cannot afford (Rosegrant and Cline, 2002). Among the four principles above, the fourth has generated a controversy since it recognises water as "an economic good". Meanwhile, the growing debate over globalisation and privatisation of water reveals the evidence of how unclear the fourth Dublin principle is to many (Gleick, et al., 2002). Subsequent to the Dublin meeting in January 1992, the United Nations (UN) Conference on Environment and Development held in Rio de Janeiro in 1992 unequivocally gave recognition to the role of economics in the efficient management of water by stating that "Integrated water resources management is based on the perception of water as an integral part of the ecosystem, a natural resource, and a social and economic good" as cited in (Gleick, et al., 2002).

There is considerable misunderstanding about what the concept of treating water as an economic good (Savenije and Van der Zaag, 2002). The true meaning of the terminology, “an economic good” has always been unclear to many and “what has been far less clear is how, practically to achieve the right balance between managing water as an economic and a social good” (Gleick, et al., 2002). In agreement, Van der Zaag and Savenije, (2000) as cited by Savenije and Van der Zaag, (2002) say that “the problem is not with the terminology; it is the interpretation that causes confusion”.

While the first school of thought believes that water must be considered as an “economic good”, the second nevertheless believes that, taking into account the importance of water to life, water must be considered as a “social good” and not as “an economic good”. Two positions have been espoused on this terminology of “water as an economic good”. The first position maintains that water should be priced at its economic value in which case the market will ensure that water is allocated to its best uses while the second interprets “water as an economic good” to mean that the “process of integrated decision making on the allocation of scarce resources, which does not necessarily involve financial transactions” (Savenije and Van der Zaag, 2002)

2.6.1 The value and cost of water

Different theories, ideas and concepts have evolved towards improving water management practices over the years and attempt to determine the true economic value of water and its provision following the ever increasing challenges bedevilling the water sector including water scarcity, inefficiencies, financial non-viability and lack of investment among others. “The old paradigm of planning and designing water supply systems, with little attention to demand determinants, pricing structures and financial policies, is not sustainable” (UNEP 1995; Varis &Somlyody 1997; Gleick 2000; Brandes & Maas, 2004 as cited by Sharma and Vairavamoorthy, 2009). Water pricing and PPP have attracted the attention of managers, experts governments, and customers because they are interlinked. According to Rogers et al., (2002), conceptually, there are many ways to promote **equity**, **efficiency** and **sustainability** in the water sector and water pricing could be the simplest way but possibly the most difficult to implement

politically and that “when the price of water reflects its true cost, the resource will be put to its most valuable uses”. Issues of water and economy are inseparable considering the strong link that exists between the two (Commission on Sustainable Development-(CSD), 2004-2005). Albeit, market-based techniques of pricing water enable the demand and supply relationship to play a very important role in determining the price of water, in most situations they are employed in irrigation and industrial water pricing (Johansson 2000). Nevertheless, the market-based approach to water pricing “has not been widely considered for household water pricing because social equity is at least as important as efficiency in determining domestic water prices” (Wang et al., 2008). Water pricing reforms in most developing countries have been always faced challenges. Sometimes, the long-standing practice and cultural and religious beliefs that have treated water as a free good, and entrenched interests benefit from the existing system of subsidies and administered allocations of water add to the difficulties (Rosegrant and Cline, 2002).

2.6.2 Cost reflective pricing and cost recovery of water services

The concept of **price, cost** and **value** according to Rogers et al., (2002), are often bewildered when dealing with water pricing. He defined **price** as an “*amount set by the political and social system to ensure **cost recovery**, **equity** and **sustainability***” and emphasise the point that cost is not the sole determinant of price for water and sometimes subsidies may or may not be included in the price. Cost relates to all expenditures incurred at every stage of water production and supply including production, transmission and distribution etc. Spencer, (1983) defines cost as cited by Van Ryneveld, (1995) as “a sacrifice that must be made in order to do or acquire something” and that the nature of the sacrifice could take many forms that may be tangible, objective or subjective including money, goods, income, security, leisure time, prestige, pleasure or power. In estimating the true economic value of water and costs related to its provision, various general principles are considered. Cost of providing water consists of both direct and indirect costs. Apart from values derived from water provision, one can also derive a value which can be affected by the reliability of water supply and water quality (Rogers et al., 1997). Rogers et al., (2002) argue that, many

who say that raising water prices is regressive and therefore reduces equity is highly incorrect and explained that "higher water rates allow utilities to extend services to those currently not served and those currently forced to purchase water from vendors at very high prices". Further, they assert that if water resources are managed in an integrated fashion where the economics, legal and environmental aspects complement each other, increased prices do improve equity, efficiency and sustainability of the resources. A clear signal is sent to users of water that, it should be used wisely if water is reasonably priced albeit cost recovery remains the prime target of water pricing (Savenije and Van der Zaag, 2002). According to Johansson (2000), whether by administrative mandate or by market forces, water pricing is an important way to improve water allocations and to encourage conservation. In any case, equity must be considered as one crucial factor when pricing water. .

One major factor that has accounted for the poor performance of most urban water utilities in developing countries is the low water prices, providing little incentive for increased water use efficiency and reducing the ability to finance capital improvement and expansion (Rosegrant and Cline, 2002). Several objectives are attained through water pricing and water tariff setting is considered as a crucial function for water utilities (Kayaga and Motoma, 2009). Two different factors account for the wide variations exhibited in tariffs charged by water utilities around the world. It is explained that:

- First "given the natural monopoly feature of water supply technology, water utilities which price water at marginal cost would tend to produce financial deficits. This feature is at odds with the objective of cost recovery needed for the long-term financial sustainability of the utility. Therefore, tariffs have to be devised so that this feature can be corrected, taking into account constraints such as low access to consumption metering"

- Second, "in practice, water tariffs and subsidies are often not the direct product of market forces. In large parts of the world, the concept of water as a social good prevails over that of water as an economic good. As a result, it is commonly admitted that full cost recovery is not an appropriate objective in the case of water services" (UN, 2007),

Meanwhile, Savenije and Van der Zaag, (2002), suggest that, if one employs the definition that economics is "about applying reason to choice" then the definitions of **full cost** and **full value** of Rogers et al., (1997 and 2002), should be used to make

allocation decisions and assert that obviously, “a certain allocation is attractive when the full value is higher than full cost”. Fundamentally, the aim of price setting is to recover the costs incurred in producing a product and services and also to provide appropriate returns on the capital invested in the business and unless all costs incurred are recovered, the financial viability of the business will be compromised leading to its collapse eventually. It is only water utilities that are able to generate adequate cash to operate and maintain their systems attract investments for system expansion and ultimately improving services (Winpenny, 2003). It therefore stands to reason that, “**cost recovery** is a prerequisite for sustainable water service provision” (Mugabi et al., 2010). Best practices suggest that price of water supply service should be set to meet economic, efficiency, financial, equity and simplicity objectives (Locussol, et al., 2009)

Real cost recovery of water and its efficient use is a recipe for financial and technical sustainability including social equity of water supply (Marobhe, 2008). Theories have it that, keeping water tariffs below cost-recovery levels imposes financial burden on governments. The implication is that governments would have to offset the deficit or difference through transfers periodically which seldom occur in the context of the developing world resulting in lack of resources for investments and network expansion that ultimately affect poor families living in the peri-urban areas (Marin, 2009). The challenge therefore is how to perform the “balancing act” of water pricing such that **equity**, **efficiency** and **sustainability** of water will be ensured. Equity, efficiency and sustainability can be promoted through water pricing policies (Rosegrant and Cline, 2002 and Rogers et al., 2002). According to Rosegrant and Cline, (2002), the main objectives of water pricing include:

- the creation of incentives for efficient water use,
- cost recovery in the water sector, and
- financial sustainability for urban water supply systems, including the ability to raise capital for expansion of services to meet future demand.

They argue that effective water-pricing policies can contribute to the objectives listed above, but several problems are associated with the implementation of such policies in developing countries. Implementing innovative water pricing will introduce incentives for efficient water use and recovery of at least operational and maintenance costs and experience from several countries has revealed that incentive pricing leads to water conservation by households, they added.

Often, it is presumed by multilateral donors, international financial and engineering consultants, and water sector professionals working in developing countries that increasing block tariff (IBT) structures are the most popular and appropriate way to determine water users' monthly bills and therefore have become the suitable choice in developing countries today (Boland and Whittington, 2003 and Liu, et al., 2003). Nevertheless, Boland and Whittington, (2003), contend that this assertion is wrong. In agreement, some researchers including (Inocencio, 2001; Weitz and Franceys, 2002) maintain that, IBTs "penalise shared connections, which are commonly found among connected low-income households".

Theoretically, the IBT structure model seems perfect but is practically difficult to apply in many developing countries. One major challenge or limitation that is associated with the IBT system of pricing is the difficulty of practically applying the formulae to different categories of customers that are usually captured or catered for within the first block of the structure that is purposely introduced to take care of low-income households. Fundamentally, increasing block tariff structures are introduced in developing countries in order to insulate the low-income households against high water tariffs while providing a strong incentive at high levels of consumption for conservation by charging industrial and commercial water users significantly more (Vairavamoorthy and Mansoor, 2006). Conversely, often the poor live in "compound houses" where only one meter usually serves about five or more households thereby making it practically impossible for the total consumption of water to be within the "lifeline'' regime. Thus, "paying for bulk water would mean large total consumption charged with higher rate due to the stepwise rate structure, and the poor therefore pay higher prices per cubic meter of water" (Inocencio, 2001). "Too often, low water tariffs have worked against the interests of the unconnected poor" (Marin, 2009). Komives et al., (2005) posit that even though it seems desirable to make piped water affordable for the poor. Research has shown that in developing countries, low tariffs have rather benefited the connected middle class. To avoid this challenge of water pricing, David (2000) suggests as cited by (Inocencio, 2001) that as a means of establishing a correct level of incentives for adequate water, sewerage and sanitation service, pricing policy must be evaluated more broadly to ensure that minimum cost and price are given to all so that consumers will be willing to pay. Gerlach, (2008), considers the design of appropriate tariff systems as a critical regulatory task, which must go hand in hand with subsidy allocation. Nonetheless,

Marin, (2009) contends that “low water tariffs are not necessarily a good thing, since good service ultimately cost money. Social objectives are often sought through cross-subsidies in the tariff structure such as lifeline (Groom, et al., 2006).

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2.8 The research gap

This literature review has necessarily been 'scene-setting' in the complex world of public private partnerships in addition to the task of determining what, if anything, the academic literature has to say about the success or otherwise of this form of reform in urban water supply.

However, the academic literature in respect of Management Contract in the water sector in low-income countries is remarkably limited. There is a multiplicity of 'grey literature' reviews of public private partnerships and economic regulation in low-income countries but very little systematic analysis of the results, particularly with regard to the specific case of Management Contracts. This literature review has confirmed that there is a research gap with regard to the comparative performance of management contracts in low-income countries. The next Chapter describes how the author planned to investigate the performance of the AVRL management contract in Ghana.

3 Research Methodology

This study is considered unique in the sense that it affords the researcher the opportunity to investigate and evaluate the financial and operational performances of three different regimes of operators in a single urban water supply system at different periods from 1984 to 2011. In summary, two field visits were undertaken to Ghana to investigate and also evaluate the performances of the water utility under three different management models during three different periods. This chapter explains how the research was undertaken, beginning with the research design, data collection strategies employed, through to technique for data analysis. In addition, various reasons for employing a particular research strategy or tool at any given stage of the research are provided and justified in this chapter.

3.1 Research design

Research designs vary very much; the investigator chooses what plan to employ depending on the research questions being addressed and the methods of data collection. Every empirical research has an implicit, and if not, explicit research design and the logical sequence that links the empirical data to the study's initial research questions and ultimately to its conclusion defines it (Yin, 2003). Others described it as a plan that

> *guides the investigator in the process of collecting, analysing and interpreting observations. It is a logical model of proof that allows the researcher to draw inferences concerning causal relations among the variables under investigation* (Nachmias & Nachmias, 1992, pp 77-78 as cited by (Yin, 2003).

Prior to the determination of the research method(s) employed in this research, finding the focus of the research so as to identify what exactly the research was seeking to do became very critical and most significant (Yin, 2009). This hurdle of the research was overcome by initially and tentatively writing down the research focus which was later refined making it more clearly focused and researchable. Approaching the research this way helped the researcher to clearly and carefully determine all relevant areas that needed to be tackled during the research and always having in mind, the central role that every researcher plays in research (Robson, 1995). Careful planning was undertaken to ensure that all research strategies and tactics employed during this research provided a strong basis for data validation based on studies done on the principles and concepts of water utility regulation and management through literature search and discussions with

my supervisors**.** Treating the research design as a “blueprint” of the research, the author first tried to address the elemental problems of the research by identifying what the relevant data were, what data or information to collect, what questions to study and how to analyse the results of the study (Philliber, Schwab, & Samsloss, 1980 as cited by (Yin, 2003). For instance, factors such as seasonal variations in water demand (i.e both raining and dry seasons) informed the periods when the interviews and questionnaires were administered. This made it possible to understand the reasons for the shortfalls in supply during the period that the private operator was in charge of the system.

Being a social research, more than one approach is available for collecting relevant data that will adequately deal with specific questions, propositions or problems. It must however, be pointed out that each approach (experiment, surveys, archival analysis, histories and case study) comes with its peculiar advantages and disadvantages (Yin, 2009). Meanwhile, according to Whyte, (1981) as cited by Robson, (1993), a case study is suited when studying organisations or institutions, policy implementation and evaluation, institutional culture, management and organisational issues, processes and adaptation. In this vein therefore, a case study is considered appropriate for this study as it shows why certain decisions were taken and implemented and their outcomes (Schramm, (1971) as cited by Yin, (2009)). Both qualitative and quantitative methods were employed to yield different types of intelligence about the study subject thereby providing a powerful resource for informing and illuminating practice or policy (Ritchie and Lewis, 2006). While the quantitative data was collected through reports, qualitative data was collected through key informant interviews, public hearings and observation. In brief, the research was carried out through three major stages or phases by initially gathering background information through literature review followed by data collection by undertaking two periods of fieldwork in Ghana in 2008 and 2010 focusing on Accra, Tamale and Kumasi. The final stage has consisted of analysing and interpreting observations, drawing up conclusions and developing recommendations. The entire research design process could best be described as flexible and exploratory since at every stage of the research changes were effected whenever necessary so as to effectively address the research objectives. There will always be some element of the unknown in management research unless it is simply duplicating what is already established (Pole & Lampard, (2002), as cited by Lewis, 2006)). Figure 3-1 below vividly explains how various activities of the research interacted during the research process at different stages or phases of the research.

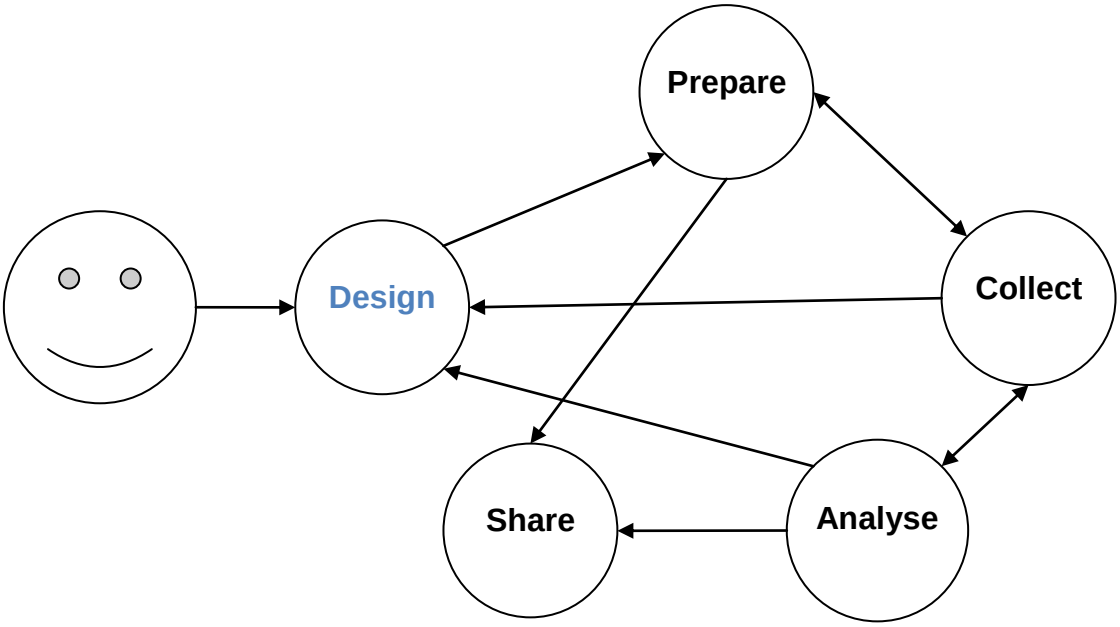


Figure 3-1 Doing case study research: A linear but iterative process

Source: (Yin, 2009)

3.1.1 Research objectives and evolution of method

Prior to the involvement of the private operator in the urban water supply sector in June, 2006, daily water shortages were being reported in most of the urban cities in Ghana. Meanwhile, customers could hardly and exactly tell what remedies or options were available to the Government of Ghana at the time. As a matter of fact, until Aqua Vitens Rand Limited was engaged, the author could hardly imagine or appreciate the gravity of the challenges that the public water utility was confronted with. This phenomenon in the urban water sector of Ghana sparked off several questions that could not easily and immediately be answered. Consequently, it provoked or generated the interest of the author to investigate the performance and challenges of the urban water utility over the years and establish concrete facts about the Ghana urban water sector. In the attempt to link the activities and mandates of all stakeholders in the urban water sector and to be able to answer the numerous unanswered questions surrounding the urban water sector and the management of the utility, the initial project was refined at a later stage of the research.

In the beginning, the aim was to investigate or assess the factors that led to the privatisation of the Ghana Water Company taking into consideration, the context within

which the public utility has been operated. However, at a later stage of the research after undertaking an intensive literature search and several discussions with my supervisors and subject advisor, it became evident that assessing the performances of the public water utility as a state owned corporation and a state owned limited liability company and the private Management Contract was more appropriate so as to establish the problems of the sector more concretely and compare the performances of the three regimes that have operated the utility over the year since 1981. The reformulation of the initial proposal to accommodate new ideas gave birth to the final research topic whose aim is to assess the effectiveness of the present form or model of private sector participation in the regulated urban water supply sector in Ghana. The study also assesses the net improvement that the partnership brought to the urban population in the five years. This was done through careful assessment of the regulatory frameworks, political, social and economic environment against the set targets of the management contract with the private operator. The repeated revisiting of various aspects of the research ensured high compatibility among purposes, theory, research questions, sampling techniques and methods reflecting the flexible nature of the design process (Robson, 2002)

3.1.2 The case study approach

A case study is defined as “an empirical inquiry that investigates a contemporary phenomenon within its real life context, especially when the boundaries between phenomenon and context are not clearly evident” (Yin, 2003). Clearly, a strategy for doing research involving an empirical investigation of a particular contemporary phenomenon within its real life context using multiple sources of evidence defines a case study (Robson, 1995). It permits the investigator to concentrate on specific instances in an attempt to identify detailed interactive processes which may be crucial, but which are transparent to the large-scale survey and emphasised that it provides a multi-dimensional picture of the situation and illustrates relationships, corporate political issues and patterns of influence within a particular context (Remenyi and Williams, 1998)).

However, a common misconception about research strategies or techniques employed in investigating research problems has been the idea of arraying various research strategies hierarchically. This misconception has given birth to a situation where researchers are made to believe that ‘case studies are appropriate for the exploratory phase, surveys and histories are appropriate for the descriptive phase of an investigation and that experiments are the only way of doing explanatory or causal inquiries ’(Yin, 1994).This he describes as “incorrect” and cited White’s ‘Street Corner Society, 1943/1955’ and Allison’s ‘Essence of Decision: Explaining the Cuban Missile Crises, 1971’ as some of the best and famous

case studies that have been both descriptive and explanatory. Case studies are considered superior to other research methods when “how” and “why” questions are being raised and the investigator has little control over events and the focus is on a contemporary phenomenon within some real-life context. One unique strength of a case study approach, such as the use of documents, interviews, observation and artefacts as a research method is “its ability to deal with a full variety of evidence – beyond what might be available in the conventional historical study” (Yin, 1994).

Increasingly, case studies are being used in business and management studies as an evidence-collection approach for several reasons including the fact that the scope of case study is intensive, ranging from individuals, to business groups, to fiscal policy (Remenyi and Williams, 1998). However, in spite of the above attributes of a case study, some researchers have disdain for it and contend that the case study approach lacks the necessary scientific rigour and reliability and incapable of dealing with issues of generalisability despite the distinctive nature of this empirical inquiry method (Johnson,1994). Yin, (1994) explains that, this assertion is being held because too many times, researchers who employed this strategy have been sloppy and permit biased views or ambiguous evidence to influence the direction of their findings and conclusions and sometimes others confuse case study research with case study teaching. He further explained that case studies are only not generalisable to populations or universes but to theoretical propositions in which case the researcher’s goal is to expand and generalise theories and not to enumerate frequencies. Three authorities in the social sciences; Lipset, Trow & Coleman (1956), cited by (Yin, 1994) described in their single case study that the goal is to do a “*generalising*” and “*not particularising*” analysis. One of the challenges of all social science endeavours is the employment of case studies for research (Yin, 2009). The exploratory and descriptive characteristics of this management science oriented research required a research strategy such as the case study to provide the needed flexibility that would allow multiple sources of evidence such as documentary evidence, observations, interviews and focus groups during data collection (Robson, 1993). A case study approach is considered as the preferred research tactic to answer the ‘hows’ and ‘whys’ of the research and establishes valid and reliable evidence since it enables the investigator to comprehend the complex real-life context from which multiple sources of evidence was drawn (Yin, 2003).

Case studies are particularly valuable when the aim of the research is to capture differences or unique variations (Patton, 1987). In attempting to have an in-depth understanding of the challenges confronting the urban water supply sector in Ghana over

the years and in the present, case study was considered as the most suitable tool capable of gathering a rich information or data for the analysis of the situation (Patton, 1987). A case study research can be exploratory, explanatory and descriptive (Yin, 1984). However, the author subscribed to the exploratory and descriptive case studies and thus helped in formulating research questions and hypothesis testing, and finally describing the challenges in the urban water sector respectively. The entire process of undertaking this research is elaborated in table 3-2 below. Data collection was undertaken based on a systematic identification of a set of performance indicators for a successful benchmarking as shown in table 3-2 below, relative to the research questions elaborated earlier:

a) Investigate the context within which Ghana Water and Sewerage Corporation (GWSC), Ghana Water Company Limited (GWCL), Aqua Vitens Rand Limited (AVRL) and Public Utilities Regulatory Commission (PURC) operated in Ghana;
b) Evaluate the performance of the urban water utility under the three different management models since its inception and
c) Investigate the role and effectiveness of the economic regulator in the urban water supply sector

Table 3-1 Research objectives and performance indicators under investigation

Objectives	*Indicators*	*Elements of performance indicators under investigation*	*Source(s) of information*
a, b and c	Quality of service	Average hour of service per day of water supply, water pressure, method used for water sampling (frequency, number and relevance of collection point), number of tests conducted on samples taken from the distribution system, standard number of tests required, potability (turbidity, chlorine, bacteriology) number of complaints from customers about services in a year, number of customers with discontinuous supply during normal operation, prompt service provision, customer relations, consistency in interactions, care, attention and trust	Annual reports from GWSC, GWCL, AVRL, PURC, household surveys and public hearings
a, b and c	Billing and collection	Accounts receivable, total annual operating revenues, annual amount of water sold, number of connections, cash income, billed revenue, billing accuracy, customer records and piracy (illegal connections) & timeliness	Annual reports of GWSC, GWCL, AVRL and PURC
a, b and c	Access	Population of service area, average household size, number of household connections etc	Annual reports of GWSC, GWCL, AVRL, PURC, and household surveys
a, b and c	Costs and staffing	Total annual operational expenses, total annual volume of water sold, total number of staff, total number of connections, annual electrical energy cost, chemical cost, total annual labor costs including benefits, total cost of service contracted-out(outsourcing)	Annual reports of GWSC, GWCL, AVRL, and PURC and audit reports of auditors
a, b and c	Financial performance	Sources of funding, total annual operational revenues, total annual operating cost, cash income and debt service, total debt, equity, current assets, and current liability, operating costs, operating revenues, depreciation and interest costs, operating income and fixed asset	Annual reports of GWSC, GWCL, AVRL and audit reports of auditors
a, b and e	Process (i)	Budgeting, target identification, resources for improvements and change, skill and training strategies, annual appraisals and target setting system for managers, remunerations, layoffs, rewards and recognition programs for staff, recruitment and dismissal of staff.	Annual reports and corporate plans of GWSC, GWCL, AVRL, PURC, , audit reports of auditors and contract document

Objectives	*Indicators*	*Elements of performance indicators under investigation*	*Source(s) of information*
c, d and e	Process (ii)	Independence of board of stakeholders, organisational structure, control of investments, monitoring of services and prices, reporting procedures, complaint collection procedure, supervision of compliance, service target, dispute resolution mechanisms, handling of complaints against GWCL, AVRL or Customers, penalty for reneging	Annual reports and corporate plans of GWSC, GWCL, AVRL, PURC, management contract document, acts and laws governing the urban water sector and audit reports of auditors
a, b, c and e	Metering practices	Total number of connections, total number of connection with operating meter, volume of metered water sold, and total volume of water sold	Annual reports of GWSC, GWCL, AVRL and PURC
a and b	Pipe network performance	Total number of pipe breaks in a year per kilometre of the distribution network	Annual reports of GWSC, GWCL & AVRL
d	Tariffs	Tariff levels, proportion of tariff increase, timing and intervals between tariff increases, validation of formula, tariff implementation, connection & disconnection charges, residential fixed & variable component of tariffs & subsidies	Annual reports of GWSC, GWCL, AVRL, and PURC
e	Political and organisational behaviour	Political stability, political interference, wage legislation (minimum wage and overtime), sector law or legal, rule of law, institutional structure, framework for contract enforcement, governance, service to the poor, regulation, tariff policy, and pricing regulation.	National water policy and management contract documents, GWSC, GWCL, AVRL and PURC reports, public hearings and interviews(semi-structured)
c	Management contract design and process	Level of empowerment, incentive, penalty, commitment and access to resources, baseline data,	Management contract document, list of SNAG items, Memorandum of understanding,
a, b, c and d	General customer perception	Average hour of service per day of water supply, water pressure, prompt service provision, customer relations, consistency in interactions, care, attention and trust and demonstrations against the private operator	News papers, public hearings, Interviews (semi-structured), household survey, and annual reports of PURC, GWCL, & AVRL

Source: Author

3.1.3 Conducting the fieldwork

It is rarely possible to test the empirical generalisation against all the members of the target population and therefore the researcher selected a sample of the overall population on which to conduct the test (Remenyi and Williams, 1998). Purposive sampling was employed as the sampling technique in this research. The public water utility operates in all ten regional capitals of Ghana but three regional capitals including Accra, Kumasi and Tamale were selected and used for the study. The sample population used was carefully picked out taking into account the political, economic, geographical, social and cultural significance that each of them represents and commands. For instance, geographically, Tamale represents the Northern zone, Kumasi represents the Middle zone and Accra represents the Southern zone. More significantly, the presence of Aqua Vitens Rand Limited in these cities informed and largely influenced the selection of the sample population comprising customers or consumers in three capital cities. Largely, the fieldwork involved household survey in Accra, Kumasi and Tamale using questionnaires, interviews using semi-structured questions, documentary evidence collection, participant observation in public hearing and general observation.

Rural-urban migration is rapidly giving birth to slums in the urban cities of Ghana. Accra, the capital city and the largest city in Ghana for several years has suffered from perennial irregular and inadequate water supply due to mismanagement and uncontrolled rapid urbanisation. Similarly, Kumasi being the second largest city in Ghana is also faced with water supply services challenges. Finally, the fastest developing city in Ghana, Tamale also has a long history of perennial shortage of water in the metropolis and thus compels women and children to spend long productive hours searching for water. Since it is important to address the perennial water shortage problems in the urban areas of Ghana to promote national development, the above reasons have made the three locations very significant, appropriate and relevant for the study. Again, eligible institutions, bodies, groups and individuals which constituted the population from which samples were drawn included the Ghana Water Company Limited (The Asset Holding Authority)**,** Aqua Vitens Rand Limited (The Private operator)**,** Public Utility Regulatory Commission (i.e. the Regulator)**,** Ministry of Water Resources, Works and Housing (MWRW&H) and Ghana Statistical Service (GSS), Customers (i.e. domestic, industrial/commercial) and people living in the slums were selected for the study. According to Richardson et al., (1992), “the researcher chooses a particular group or place to study because it is the type wanted for the research” and “the researcher selects the sample based upon his or her judgment about some appropriate

characteristics, required of the sample members. In this way, he builds up a sample that is satisfactory to the specific needs. The researcher selects a sample to serve a specific purpose even if this makes a sample less than fully representative" (Zikmund, 1994).

3.1.4 Questionnaire-based survey

According to Kerlinger as cited in Taylor, (1994), questionnaires are widely used in the collection of data in research because of their effectiveness in securing factual information about practices and conditions, and for inquiring into the opinions and attitudes of the subject. Richardson et al., (1992) asserts that the most important survey methods, from the point of view of the lone researcher are questionnaires. Osuala (1993) further explains that questionnaires are particularly advantageous whenever the sample size is large enough to make it uneconomical for reasons of time or funds to observe, or interview every subject. In this study, two main types of questionnaire were employed including household questionnaires and key informant semi-structured questionnaires. Household surveys were conducted using questionnaires that principally were targeted at answering questions regarding how customers felt about services they were receiving, the challenges confronting them, how much they were paying for the services and for how long water was flowing through their taps, customers' experience with water service providers and why certain things happen; what in their candid opinion could be responsible for the sector challenges and what remedies were available to avert the sector challenges, whether or not they saw some improvements in the services delivered by the private operator.

This technique was used to compensate for any limitations that other techniques might be associated with. Customers from three regional capitals constituted the population from which data was collected including Accra, Kumasi and Tamale. In identifying or selecting the sampling frame, firstly, the researcher had consultations with some water customers (i.e. piloting questionnaires), technical staff/field officers and revenue collectors of the service provider in order to ensure that whatever information was collected from each sample population would adequately represent the views of the larger community from which respondents were selected. Following the identification of the sampling frame which included various categories of customers from four different communities in each of the three urban cities (described in detail below), the author visited the selected cities to look for skilled data collectors and subsequently arranged for the household survey to be conducted. Prior to the survey conduction, training was

provided to data collectors or interviewers to avoid the possibility of influencing responses of respondents or interviewees by attempting to indicate correct answers (Robson, 2002). During the training, data collectors were given the opportunity to ask questions and sufficient explanations were provided to ensure data collectors truly understood their tasks before the commencement of the survey. The data collectors were selected from their respective cities based on their ability to speak both the English and local dialects and academic qualifications so as to ensure that every class or category of customers in the communities during data collection was effectively engaged. Two Teaching Assistants (TAs) from the Marketing Department of Kumasi Polytechnic who were indigenes of the region were engaged to collect data in Kumasi. Similarly, two Teaching Assistants (TAs) from the Agricultural Engineering Department of Tamale Polytechnic were used in Tamale. Finally, two undergraduate students from the Institute of Professional Studies (IPS) - Accra and Ghana Institute of Management and Public Administration (GIMPA) and one graduate from the University of Ghana were engaged in Accra. In order to ensure reliability and quality of data collected by the data collectors, biases that could be introduced through familiarity were eliminated by preventing interviewers from carrying out the household surveys in their own communities. It is also worth mentioning that all the interviewers had undertaken household surveys prior to this survey. With their experiences and skills in data collection already, they understood and knew the dos and the don’ts of face-to-face interviews.

The draft questionnaire was pre-tested using colleagues in the office to read and make comments in order to improve the quality of the questionnaire. In addition, questions were made simple and clear to respondents during the survey (Robson, 2002). Both customers and non-customers of the water utility were targeted in order to collect the necessary and relevant information on water services provided to the urban population. Four categories of the communities were identified and selected for the survey and ensured that the sample population reflected different household income levels of customers and characteristics including:

- One community that was receiving regular water supply
- One community that was receiving irregular water supply (water rationing)
- One community that was receiving water from other service providers other than AVRL/GWCL
- One slum community in each of the cities

The categorisation was done purposely to identify various challenges facing different classes of water customers in different communities in the same city. In each of the four communities used, fifty questionnaires were administered to each of the four categories of communities identified above in each of the three cit. In all, two hundred questionnaires were administered in each of the three cities resulting in a total of six hundred questionnaires administered in Accra, Kumasi and Tamale in 2010. Majority of questionnaires administered to interviewees were done on face-to-face basis thereby making the exercise very expensive and time consuming but gave birth to the desired high response rates. Sampled communities in Accra included; Adenta, East Legon, Teshie and Nungua, in Tamale; Kukuo, Gumbihini, Moshie-Zongo, and Jisonayilli and finally in Kumasi; Bremang, Amakom/Asafo, Asawase/Moshie Zongo and Tafo.

Again in 2013, thirty questionnaires each were administered in Accra and Tamale. Out of this numbers, only 27 respondents voluntarily offered to fill in the answers on their own since they were engaged at the time the interviewers wanted to engage them. More significantly, the interviewees were assured of the confidentiality of the information they were providing. A substantial amount of effort was invested in making sure that the data collected was of good quality in terms of accuracy and adequacy and truly reflects the performance of GWSC, GWCL, AVRL and PURC under investigation.

3.1.5 Documentary sources

With the exception of societies predating the use of writing, documentary information is likely to be relevant to every case study topic (Yin, 2009). Documentary evidence or analysis serves as a source of cross-validating, corroborating and augmenting evidence gathered through other sources such as household survey, public hearings, interviews and observation since what people say maybe different from what they do sometimes as in the case of this study (Yin, 2009; Noor, 2008). Secondary data was collected from different organisations including the Ghana Water Company Limited (Asset Holding Authority), Aqua Vitens Rand Limited (private operator), Public Utility Regulatory Commission (the regulator), Ministry of Water Resources, Works and Housing (MWRW&H), Ghana Statistical Service (GSS) and the internet. Documents gathered included audited operational/technical, and commercial reports, audit reports, audited financial statements, performance review reports, corporate plans of GWSC/GWCL, technical audit report by the World Bank, memorandums of understanding, notes on snag items, letters, PURC Act, 1997 Act 538, contract documents, monthly and annual

reports of AVRL, annual reports of PURC, annual reports from the Customer services and Finance and Administration Directorates of the PURC), Regional reports on treated Water, and the Ghana Living Standard Survey reports etc.

A particular effort was made to determine quantitative data regarding the financial position of the service provider over as long a period as might be possible. With some success in this area (though noting the sometime incompatibility of financial data recorded during different periods) it was planned to include an element of longitudinal comparison in the analysis to make up for the lack of any present day comparator. An overview of the financial data compiled, data collected to represent a significant time period, is demonstrated at the conclusion of Chapter 5. This data is used extensively in the analyses reported in Chapters 5 and 6.

3.1.6 Interviews

In combination with other methods, semi-structured interview questionnaires were conducted using interview guides. The strategy provided the author the opportunity to seek personal perspectives and perceptions of workers of the water utility and other stakeholders in the sector on the performance in detail which enhanced the appreciation of the deep rooted challenges of the sector (Ritchie and Lewis, 2006). Not only that but the approach also offered sufficient flexibility to approach different respondents or interviewees differently while still staying focused on the same and relevant areas of data needed for the research (Robson, 2002; Noor, 2008).

Fundamentally, the aim was to investigate some of the political, financial, social and managerial challenges that these institutions face which might not be published in the company's reports. Here, the researcher asked respondents or interviewees to propose their own opinions about the urban water supply sector in relation to the management contract and also suggest possible ways of surmounting the challenges in the sector. In June, 2008 just exactly two years into the participation of private operator in the urban water sector, the first phase of these interviews was conducted and the second phase undertaken in 2010, the final year of the contract. Responses to the interviews undertaken in the year 2008 served as an eye-opener to the researcher. The experience gathered during the first visit influenced substantially the way the second fieldwork was approached by way of planning, timing, and how dates were scheduled for interviews. Many officers (respondents) who were contacted during the first fieldwork could be

accessed more easily during the second fieldwork because of the good rapport that the author maintained with them after the first interaction. For instance, before meeting these key informant respondents for the first time, the author had to be introduced to them by contacts they knew well since there was a marked reluctance to meet with any researcher. Hence after the initial introduction, the researcher ensured that he established cordial and personal relationships with respondents and kept communicating with them using e-mails and telephone calls after the first fieldwork knowing very well that a second fieldwork would be undertaken. As a matter of fact, this attitude of the researcher towards these interviewees made it easier for the author to undertake the second fieldwork even though it could not entirely be described as “challenge-free”. During the interviews, a digital voice recorder was used to record every conversation in order to ensure that an accurate account of what truly transpired during these interviews was sufficiently captured and also to avoid losing vital submissions that could not have been written down during the conversations. Later, all files were carefully and properly labelled with names of respondents or interviewees and dates in order to avoid complications. Key informants involved some junior and managers/senior officers of Ghana Water Company Limited, Aqua Vitens Rand Limited (private operator), Directors of Public Utilities Regulatory Commission and water vendors. At the head office of the Ghana Water Company Limited, (Asset Holding Authority) staff such as the procurement officer, head of planning, water quality analysis, account officers and head of the production unit were interviewed while at the PURC and Ministry of Water Resources Works and Housing, Directors were engaged. It is significant to state that it became very difficult to interview staff of Aqua Vitens Rand Limited at the head office even though the researcher managed to speak to a few of them, likely due to the sensitivity regarding the private management contract.

Table 3-2 Data source for research questions

Source: Author's Fieldwork

	Item	Sources of data			
		Questionnaires .	Documents.	Focus group discussion	Inter-views
Contextual and environmental factors	Population and population growth		√		
	Poverty levels		√		
	Fragility level		√		
	Policy framework	√	√	√	
Roles of the economic regulator	Protection of consumers and service providers	√	√	√	√
	Provision of tariff setting guidelines	√	√	√	√
	Tariffs approval	√	√	√	√
	Performance monitoring		√	√	
	Promotion of competition among sector players	√	√	√	√
	Assets evaluation	√	√		
	Advise for government and the general public on water sector issues	√	√		
	Studies on economy and performance of GWSC, GWCL, AVRL		√		
	Capacity building in the water sector		√	√	√
	Awareness creation on regulation and service provision		√		√
	Incentives for the provision of water to the urban poor	√	√	√	√
	Achievement of commercial viability by the public utility	√	√		
	Accountability in the urban water supply sector	√	√		

	Transparency in the urban water supply sector	√	√		
Institutional arrangements	Autonomy of PURC	√			
	Multi-sectoral regulatory function of PURC	√	√		
	PURC's reporting mechanisms	√	√	√	√
	PURC's funding mechanisms	√	√	√	√
	Appointment of Commissioners to the Commission	√	√	√	√
	Appointment procedure for the staff	√	√	√	√
	Consumers involvement in regulation processes		√	√	√

3.1.7 Public Hearings

Another strategy employed in collecting information was through attending a number of public hearings. Originally, this method was never considered and planned for. It came about when **i**n March and April of 2010, the Public Utilities Regulatory Commission organised forums throughout the country to solicit views and comments of customers on water and electricity tariff proposals submitted to it by the Ghana Water Company Limited (GWCL) and the Electricity Companies. This national forum offered all categories of customers of the urban water utility and all electricity companies the opportunity to meet with both the service providers and the regulator at a common forum to express their challenges and frustrations in respect of the services provided to them by these utility companies. Not only that, the forum afforded the regulator the greatest opportunity to receive at first-hand vital information regarding the quality of services rendered to customers by the utilities before a final decision is taken to either maintain or increase the existing water and electricity tariffs.

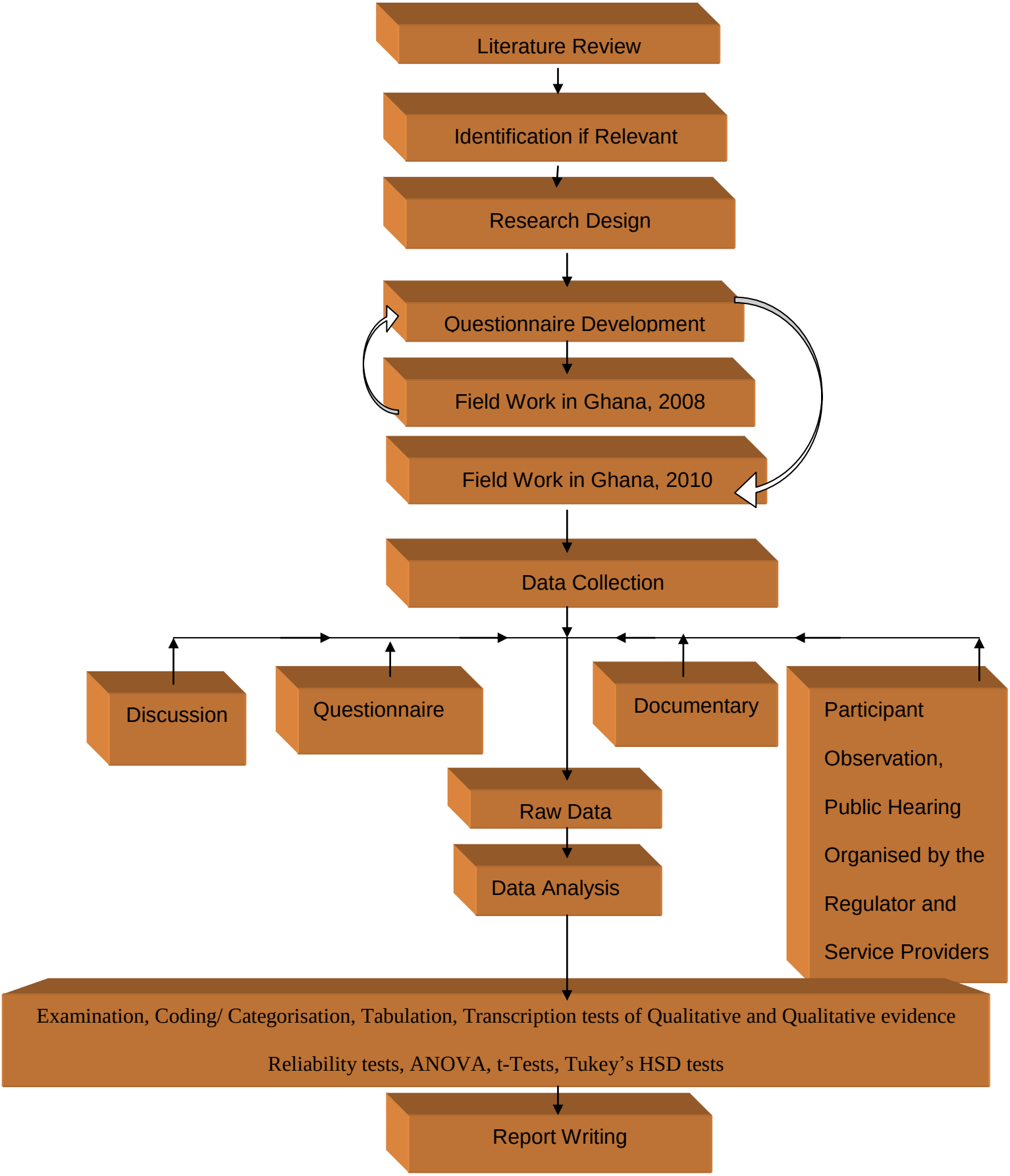
The researcher considered these public hearings as a usefully complementary source of collecting data on the perceptions of customers. It acted as a technique that was employed to cross-validate information or data collected from household survey, observation and interviews. Overall, the author participated in four of the eight regional public hearings that took place in Accra (Greater Accra Region), Hohoe (Volta Religion), Kumasi (Ashanti Region), and Tamale (Northern Region). In Tamale, customers from three regions were put together to participate in the public hearing. It comprised of different categories of stakeholders from Northern, Upper East and Upper West regions

where various interest groups were organised and transported from Bolgatanga (Upper East Region) and Wa (Upper West Region) to participate in the forum held in Tamale. This arrangement was undertaken because the regulator expressed its inability to organise separate meetings for the Upper East and West regions. This offered the author the opportunity to listen to challenges, views and comments of customers from six regions out of the ten in all which otherwise would have been very difficult, impossible or too expensive to be organised the researcher. It is significant to mention that different interest groups that participated in these public hearings gave the author more insight into the challenges facing customers and service providers. It included representatives from Traditional Rulers, Ghana Tailors' Associations, Agricultural Workers' Union, Ghana Chamber of Commerce, Student Groups, Hair Dressers' Association and the rest of the general public.

The discussion at all the forums were recorded using a digital voice recorder to ensure accurate account of what transpired among stakeholders at the meetings and to avoid losing vital submissions that could not have been written down during these meetings. All files were carefully and properly labelled with names of city and dates in order to avoid complications. The author also had the opportunity to interview some principal officers from amongst the stakeholders after each forum so as to clarify comments that were not clear to the author during the meeting.

Figure 3-1 Public hearing for the determination of utility tariffs in water and electricity in Teachers' Hall, Tamale, Source: Author. Tamale, 2010

Flow Chart of Methodology



4 The Public Utility Regulatory Commission (PURC), Ghana

4.1 Introduction

For two out of the three service entities being considered in this study there has been an economic regulator in the sector, potentially a 'confounding issue' in analysis of service performance and, equally importantly, perhaps being a key determinant of service performance, irrespective of institutional model. It is therefore necessary to undertake a detailed analysis, based on fieldwork, of the performance of PURC before considering the effectiveness of the different management models of service delivery.

Statutorily, the Public Utilities Regulatory Commission (PURC) serves as a multi-sector utility regulator that is established and mandated by an act of Parliament, Act 538 on 16th October, 1997, eventually becoming operational in 1999. Primarily, the aim of establishing the Commission is to regulate and oversee the provision of services by public utilities to consumers. Institutions regulated by the PURC include; the Ghana Water Company Limited (GWCL), the Volta River Authority (VRA), Northern Electricity Development (VRA) and the Electricity Company of Ghana (ECG).Even though, members of the Commission are appointed by the President in consultation with the Council of State, the independence and autonomy of the commission is guaranteed in section 4 of the Act establishing it. Conspicuously, it demands that "subject to the provisions of this Act, the Commission shall not be subject to the direction or control of any person or authority in the performance of its functions".

Meanwhile, government interferes in the functions of the economic regulator greatly. This sometimes lead to unnecessary delays in tariff increases to the extent that even when tariffs are reluctantly approved finally, customers complain about the quantum leap. They argue that it is more acceptable if these increases are staggered over a reasonable period of time. Government sometime prevents the PURC from adjusting tariffs with the promise that the difference would be paid to the water utility which government always find difficult to fulfil. For instance, because of the national elections in 2000, water tariff had to be increased by 96 percent in 2001 as there were no tariff adjustments from 1999 in spite of the high inflation rates of 40.54 percent that occurred in 2000.

Setting the pace for financial sustainability and good performance in 2001 by the tariff adjustment leading to a situation where operational cost per cubic metre of water produced was less than the approved tariff. In spite of the leap in tariffs, GWCL failed to generate enough revenue to meet its operational costs during the year due to low billing and collection efficiencies and high non-revenue water. It is in this regard that one of the core mandates of the PURC is to ensure that cost reflective tariffs are approved for commercial viability of the utility. Meanwhile major reviews of tariffs are done in every five years taking into account some exogenous factors that may affect its operations such as inflation and fluctuating exchange rates that lead to exchange losses. Through a consultative process, a water policy framework was developed and adopted for implementation in 2007. In this policy document, water was considered as an economic good.

As part of its mandate, Section 3 of the Act demands that the commission:

i. provides guidelines on rates chargeable for provision of utility services;
ii. examines and approve rates chargeable for provision of utility services;
iii. protects the interest of consumers and providers of utility services;
iv. monitors standards of performance for provision of services;
v. initiates and conduct investigations into standards of quality of service given to consumers;
vi. promotes fair competition among public utilities;
vii. conducts studies relating to economy and efficiency of public utilities;
viii. makes such valuation of property of public utilities as it considers necessary for the purposes of the Commission;
ix. collects and compile such data on public utilities as it considers necessary for the performance of its functions;
x. advises any person or authority in respect of any public utility;
xi. maintain a register of public utilities; and
xii. performs such other functions as are incidental to the foregoing

. Overall, its role covers the following areas:

i. setting and approval of cost reflective tariffs for GWCL
ii. protection of all stakeholders in the urban water sector including consumers
iii. development, monitoring and enforcement of service standards
iv. Education of the general public on urban water supply services and
v. Promotion of water provision to the poor in the urban areas of Ghana.

Meanwhile, according to section 16 of the Act, no public utility is allowed to fix any rate to be charged for any service provided by it unless the rate is in accordance with guidelines provided by the Commission. In preparing guidelines on level of rates it is stated that the Commission should take into account:;

i. Customer interest
ii. Investor interest
iii. The cost of production of the service
iv. Assurance of financial integrity of the public utility

Policy framework for urban water services

In June 2007, through a consultative process, a policy framework was developed and adopted to govern the activities of all stakeholders in the water sector of Ghana (Government of Ghana, 2007). The policy framework defines the institutional framework for water supply services and its regulation in the urban areas of Ghana. Nonetheless, in the policy framework, water is considered as an economic good and thus makes the policy framework unclear and incoherent leading to some of the challenges in the urban water sector.

4.1.1 Data sources

Evidence gathered came from various sources including documents, key informant interviews, focus group discussions, and questionnaires. Discussions were held with some key sector stakeholders. Two people each from GWCL, PURC, AVRL and Non-Governmental Organisations and one person from Water Resource Commission served as key informants during the interviews. Questionnaires were also administered to 25 respondents in the urban water sector. This was done in order to ascertain the views or positions held by some key sector players regarding the specific roles of the economic regulator taking into account the level of monopoly power that the urban water utility enjoys. In this case, three (3) respondents were selected from the PURC, two (2) from government, ten (10) from the Grantor (GWCL) and ten (10) from the private operator (AVRL). Strategically, the respondents were selected from these units taking into account the institution or organisation in which they work, the individual's knowledge, expertise and experience in the urban water supply sector, position the individual had held and was holding at the time of the research and the number of years one has been in the sector. In all, the 25 respondents comprised of 21 senior officers and 4

technicians. The questionnaire administered to the twenty five respondents covered the following;

i. the functions/roles of the Public Utility Regulatory Commission as a regulator
ii. the activities and functions that are seen to be performed by the regulator
iii. other activities considered relevant that the regulator should be seen to be undertaking
iv. benefits that could be drawn from effective and efficient regulation

4.1.2 Results from questionnaire showing perception of respondents on roles of Public Utility Regulatory Commission (PURC)

Results emanating from questions administered to the 25 respondents in respect of specific roles of PURC as an economic regulator for the urban water supply sector in Ghana are shown in table 4-1. The author attempts to investigate specific roles of the economic regulator taking into account the level of monopoly power that the urban water utility enjoys. As depicted in table 4-1, respondents generally agreed that in establishing a regulatory framework for the urban water sector will inject efficiency and effectiveness into the services of the urban water utility. Albeit respondents agreed that aside economic regulation, there are other forms in which the utility could be regulated including water quality, environmental, social, technical standards regulations. It is however worthy of note that this study is limited to economic regulation. As indicated earlier, a total of 25 respondents were employed during the investigation. Table 4-1 shows the results depicting various levels of respondents' agreement or disagreement.

Table 4-1 Roles of the economic regulator from questionnaire responses

Serial number	The responsibilities of PURC are;	Level of agreement (%)					Valid responses
		Strongly agree	Agree	Uncertain	Disagree	Strongly disagree	
1	To set performance service standards for the service provider	75	25	0	0	0	24
2	To protect all stakeholders including customers/consumers	96	4	0	0	0	25
3	To advise government on issues of urban water supply services	91.7	8.3	0	0	0	24
4	To develop clear guidelines for setting water tariffs	64	36	0	0	0	25
5	To ensure that the urban water supply sector is sustainable	80	15	5	0	0	25
6	To prevent market failure in the urban water sector	40	56	4	0	0	25
7	To promote competition among all service providers in the urban water supply sector	64	20	16	0	0	25
8	To negotiate contracts involving private operators	50	29.2	20.8	0	0	24
9	To provide service guidelines on governance structure in the sector	24	52	8	16	0	25
10	To evaluate assets of service providers	25	20.8	25	29.2	0	24
11	To issue licence to service providers	72	20	4	4	0	25
12	To develop policy guidelines on subsidies for the urban poor	37.5	29.2	20.8	12.5	0	24
13	To develop performance guidelines for service providers to ensure that there is effectiveness and efficiency	28	50	0	24	0	25
14	To evaluate the performances of service providers	65	25	10	0	0	25

15	To develop a regulatory framework to ensure effective and efficient regulation of activities of all stakeholders in the urban water sector	66.7	29.2	0	4.1	0	24
16	The urban water supply sector necessarily requires an independent economic regulator for efficient and effective service delivery	88	12	0	0	0	25
17	To control tendencies of service providers exhibiting monopoly power	66	28	6	0	0	23
The following types of regulation are necessary in the urban water supply sector of Ghana							
18	Social regulation	76	12	4	8	0	25
19	Economic regulation	92	8	0	0	0	25
20	Operational/Technical regulation	56	24	12	8	0	25
21	Water quality regulation	42	58	0	0	0	22
22	A regulatory framework is necessary due to lack of transparency, accountability and poor governance	64	29	4	3	0	23
23	Efficient and effective economic regulation of a water utility would promote efficiency, accountability, commercial viability and transparency in the urban water supply sector	40	44	16	0	0	25
24	Both financial and managerial autonomy could be achieved through effective and efficient regulation	73	15	12	0	0	24
25	Efficient economic regulation of the water utility would promote commercial viability of the utility.	40	57	3	0	0	24
26	Effective and efficient economic regulation leads to improvements in performance generally.	92	8	0	0	0	25
27	Economic regulator should be seen to be promoting policies that ensure that the urban poor are served	35	65	0	0	0	23
28	Small-scale water service providers also need to be regulated	35	19	44	4	0	24
29	All contracts with private operators must involve the regulator	56	7	11	26	0	25

	Would you agree that, for water supply services to improve, it requires that the economic regulator:	**YES (%)**	**NO (%)**	**Valid responses**
30	Institutes punitive measures against utilities that do not comply with the guidelines set by the regulator	96	4	25
31	Takes legal actions against utilities if necessary	80	20	25
32	Develops more incentive packages to service providers	100	0	24
How would you like the small-scale water service providers to be regulated?				
33	A different regulatory framework should be developed for regulating small-scale water service providers	40	60	25
34	Small scale service providers should be encouraged to form associations for easy regulation	91.3	8.7	23
35	Small scale service providers should be regulated through GWCL	80	20	25
What should be done to ensure that the urban poor are fairly treated in the provision of water?				
36	Special incentive packages be introduced into the tariff structure in order to attract service providers to serve the urban poor	92	8	25
37	Water policy should be developed which makes it obligatory for the public utility to serve the urban poor	80	20	25
The regulation of business plans and strategies of GWCL (i.e. employment and deployment policies, contracting, procurement policies, tariff structures etc) would;				
38	Promote transparency and discipline in staff recruitment processes	40	60	25
39	Encourage prudent financial management	88	12	24
40	Ensure effective and efficient application of utility's resources	92	8	25
41	Prevent overstaffing and understaffing situations	60	40	25

Source: Author's analysis of data

Perceptions held by the 25 respondents drawn came from the PURC, government, and the Grantor (GWCL) and the private operator (AVRL) in respect of PURC's role as an economic regulator in the urban water supply sector of Ghana is presented in table 4-1 above. Generally, majority of the respondents agreed to the suggestions or assertions made in the questionnaire. However, in few cases respondents disagreed with the assertions. For instance, it was suggested to respondents that if business plans and strategies of GWCL are regulated, transparency and discipline in staff recruitment

processes will be promoted but majority of respondents disagreed with this assertion with the reason that nepotism and political patronage is still prevalent in the public sector of Ghana. Not only that but also, there was no clear cut position on whether the evaluation of assets of the service provider should be the responsibility of the economic regulator, PURC. Finally, 60 percent of respondents disagreed with the suggestion that small-scale water service providers will be better regulated if a different regulatory framework is developed for them.

Detailed explanation of the results is given below in relation to the different perceptions.

Approval of tariffs leading to commercial viability

It took the economic regulator well over five years after its establishment before a water tariff policy was developed in 2005. This was aimed at ensuring that commercial harmony is created between the GWCL as the service provider on the one hand and customers or consumers on the other hand taking into account the performance of the service provider (.i.e. efficiency, effectiveness, quality of service) and other exogenous factor in tariff setting for commercial viability of GWCL. other, through ensuring the best possible value, price and improved quality of service. In this case, cost reflective tariffs are expected to be approved for implementation. The policy however accepts a uniform rising block tariff structure with a lifeline tariff of $6m^3$. Even though the incentive was deliberately directed towards the urban poor it failed to make the intended impact. Instead, it largely favours consumers with smaller family sizes and who have their individual household connections and meters. This is because the urban poor in Ghana usually live in compound houses where one meter serves all families in the compound.

Majority of customers contacted during the investigation agreed that GWCL needs to be commercially but complained about quality of service as would be seen in subsequent chapters. One of interviewees said that, "*it is difficult for the economic regulator to perform its functions and therefore one cannot believe that GWCL will ever become viable commercially."* But one may ask whether cost reflective tariffs could necessary lead to cost recovery and therefore could provide all the solutions to the financial woes of GWCL? As shown in figure 4-1 below, more factors account to the woes of GWCL.

Generally, respondents stated that commercial viability of GWCL could be achieved through effective and efficient regulation and approval of appropriate tariffs. However, figure 4-1 refutes the perceptions and assertion held by many that low tariff levels continues to account for accounts for the financial woes of the public utility. It is evident

that, albeit the economic regulator somewhat helped the service provider to achieve cost recovery from 2003 to 2010, the average tariff of a cubic meter of water was more than the unit cost of production (i.e. cost of operation and maintenance but excluding depreciation or any cost of capital).

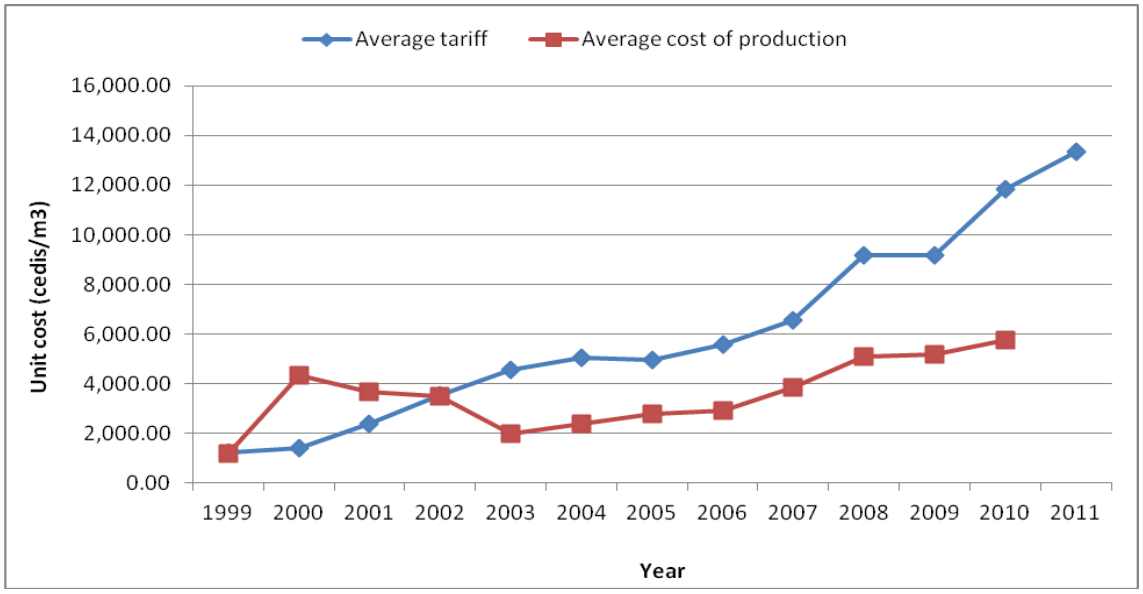


Figure 4-1 Ghana case - Average tariff per cubic volume of water versus average unit cost of water produced. Source: Author's analysis

The author therefore believes that low billing and collection efficiency and high non-revenue water somewhat are major challenges to GWCL's achievement of full cost recovery. From the analysis of responses from the respondents, the following factors are necessary for the commercial or financial viability of GWCL;

i. Development of clear guidelines for setting water tariffs
ii. Development of performance guidelines for service providers that ensures efficiency and effectiveness

Consumer protection

The economic regulator protects customers by ensuring that tariffs reflect actual cost of water services provided and services provided meet agreed standards. In order to ensure that tariffs relate consumers' levels of affordability, PURC assesses all complaints of customers whiles the Bureau of Consumer Services (BCS) at the PURC Secretariat ensures that quality services are provided by the water utility.

A consumer proposed that the PURC must ensure that services are efficiently and effectively delivered during the focus group discussions while another customer from ISODEC - a Non-Governmental Organisation that vehemently opposed the involvement of the private operator argued that PURC should prevent GWCL from exhibiting monopoly power by making sure that water tariffs the cost of services that it provides otherwise customers may only be paying for the inefficiencies of the service provider and added that some level of competition is necessary within the urban water sector. There is also the need to enhance transparency within the sector by regularly publishing reports on the water utility's performance by the PURC they added. Evidently, the tariff structure employed are never understood by customers and therefore demanded that customers are adequately educated on it.

This assertion was however confirmed during the interviews when an interviewee said that the posture of GWCL exhibits complacency in its operations since customers or consumers have little or no choice to make. He therefore suggested that PURC institutes punitive measures against the GWCL so as to ensure efficient and effective service delivery. Also, all respondents of the questionnaire agreed that it is the responsibility of the economic regulator to protect customers.

Generally, it was agreed that protection of customers could be done if;

i. effective consumer complaints and resolution mechanisms are employed
ii. water tariffs cover operational costs but reflects affordability levels of customers especially the urban poor
iii. the public is well informed about the roles of the PURC and the service providers
iv. performance reports of service providers are published regularly,
v. obligations and rights of sector stakeholders are publicly displayed.

Monitoring the performance of the GWCL

Monitoring the performance of GWCL has become more critical and crucial considering the abysmal performance of the public utility for over three decades now. PURC has the mandate to monitor the performance of GWCL. According to the PURC, GWCL failed to achieve most of the targets set for GWCL as stated in the regulators 5-year review report (PURC, 2005). It is however not deterrent enough for the regulator to only expose the inefficiencies and ineffectiveness of the service provider without applying the appropriate incentives, penalties or sanctions against it even though PURC says penalties are applying during tariff setting and approval processes – a position many people disagreed

with. Since the performance of GWCL is a major component of this study, the author has done a more comprehensive work on the performance of GWCL in subsequent chapters

Through the focus group discussions, PURC identified three main approaches by which it monitors the performance of GWCL. They include:

i. Auditing.
ii. Routine inspections of operators' physical facilities, equipment, premises, plants and its service areas.
iii. Surveys through public forum in order to receive feedback from customers as described in chapter 3.

Nonetheless, some of the interviewees registered their frustrations about lack of clear performance guidelines having specific service targets that would ensure efficient regulation of the water utility's operations. During the interview, one interviewee blatantly stated that "*the software component of urban water supply services must be left for people who understand the water business and not the engineers as we have now"*.

Generally, it was agreed during the focus group discussions, interviews and responses of respondents that the performance of GWCL should be monitored by the regulator and further requested that performance review reports must be regularly done and made public to ensure transparency. Finally, there was general agreement that competition should be promoted among all stakeholders in the urban water supply sector in Ghana.

Promotion of competition in the urban water services delivery

A regulatory framework is necessary to prevent the service provider from enjoying a monopoly power that would affect customers respondents stated generally. Where regulation is weak, a water utility exploits its monopoly power.

From the focus group discussions, key informant interviews, and questionnaires administered, it was found that for PURC to effectively and efficiently perform its monitoring functions it should;

i. develop performance guidelines for the public utility with specific performance targets
ii. apply all service rules and standards to the operations of GWCL
iii. apply sanction whenever necessary and
iv. evaluate GWCL's performance and make the review reports public

Advisory services and knowledge base on urban water services

PURC being the referee must understand the activities of all urban water supply sector players and therefore it was universally agreed that the task of PURC performing the advisory role is paramount. However, what was unclear was whether or not PURC is given the opportunity to play its roles effectively in this regard. In view of this, it was suggested that;

i. the sector ministry should closely collaborate with PURC considering its rich knowledge in the urban water sector of Ghana
ii. PURC should be well resourced to undertake more studies in the urban water sector for effective regulation and appropriate policy formulation.

Services to the urban poor

The Act mandating the PURC to perform as an economic regulator failed to impose any specific obligation on the regulator to provide water to the urban poor. Unfortunately, this challenge directly relates to issues of role of the customer/consumer and protection and affects largely persons who receive water directly from the service provide and therefore presents a limitation. Clearly, the regulatory functions of PURC can be said to be skewed towards services that are delivered directly by GWCL. Only 15 percent of the urban poor were had house connection a (PURC, 2005). Thanks to PURC for developing a social policy in 2005 which clearly outlined its role and interventions on water supply services to the urban poor. This social policy introduced a lifeline tariff component of $6m^3$ volume of water per household per month that is specifically directed at assisting the urban poor. According to PURC, the lifeline tariff reflects affordability but is higher than basic operational unit costs but excluding depreciation and return on capital (PURC, 2005).

Even though PURC gives no concessions to the urban poor in respect of connection fees, lack of sufficient network makes it sometime makes it difficult for the urban poor to do house connection rather than the cost of connection (PURC, 2005). However, through a funding mechanism designed by the PURC, any strategy of the service provider that is specifically designed to help the urban poor to access piped water is

promoted and supported. For instance, from the US$130 million of the urban water project financed by the World Bank, US$10 million was specifically set aside for pro-poor activities. The PURC also recognises the existence alternative sources of water supply services but believes that the other sources of services rendered by water vendors and water takers could hardly be regulated in respect of rates charged except the quality of water. Meanwhile, water sold to persons or entities that provide secondary market services are subject to price regulation of PURC. The activities of water tanker operators are very much visible in Accra, Cape coast, Kumasi, and Sekondi-Takoradi male. The associations of various water tanker operators regulate their own activities. While some discussants during the group discussion felt that the activities of the alternative water service providers such as water taker operators can be regulated, others disagreed with the reason that it is not a well-organised group and therefore would be difficult to do. In addition the “water mafia” will frustrate whoever attempts to ensure sanity in that the water sector.

It was generally observed that the existing regulatory framework somewhat has unfairly neglected the urban poor. An interviewee from the PURC believes that it is the responsibility of the Commission to ensure that the urban poor access good quality water. Meanwhile, majority of respondents were of the opinion that PURC as the regulator should promote social values of water and ensure that water is provided to the urban poor. Albeit it seems impossible to provide these services directly to the urban poor, government could collaborate with small scale water service providers to achieve this objective.

As can be seen in the results displayed in table 4-1 above, (.i.e. rows numbered 36 and 37), 92 percent of the respondents agreed that special incentive packages should be introduced into the tariff regimes in order to attract service providers to serve the urban poor and 80 percent agreed that water policy should be developed imposing a social obligation on the public utility to serve the urban poor.

Finally, it was suggested that the provision of water services to the urban poor could be done by;

i. developing new regulatory tools for alternative service providers e.g. licensing
ii. having a deliberate national policy that ensures that government provides subsidies towards the provision of water to the urban poor and
iii. using effective consultative mechanisms among all players

Institutional arrangements of PURC

Perceptions and information gathered on the institutional arrangements for the PURC through documents, the focus group discussions, questionnaires and key informant are presented in this section.

Generally, respondents agree with Government's decision to set up an autonomous body or institution to regulate the services of GWCL, ECG and VRA and further indicated that making PURC part of a Government ministry would compromise its autonomy.

On whether or not;

i. a separate body should be set up to undertake the regulatory functions?
ii. to create a regulatory body within the relevant ministry as a department?
iii. Contract out some critical elements of the regulation to competent private firms?

Majority of respondents disagree with the position that the regulatory body should be created within the relevant ministry as a department. Furthermore, the fear of government manipulating and interfering in the operations of the regulator for short term political interest if the regulatory functions of PURC were made to reside in the political sphere of Government was highly registered. However all 25 respondents agree that a separate entity is required to undertake the regulatory functions. Economic regulation was considered as a critical function for the urban water market.

Table 4-2 Questionnaire responses on Institutional arrangements of PURC

Serial number	Statement	Level of agreement (%)					
		Strongly agree	Agree	Uncertain	Disagree	Strongly disagree	Valid responses
1	If the regulatory body resides within the political sphere of government, its functions may be compromised or manipulated for short-term political gain or interests.	88	12	0	0	0	25
2	In engaging a private operator, it is necessary to involve a regulator to ensure that the all regulatory issues are properly captured in the agreement.	32	20	4	24	20	25
3	The engagement of the private operator in the urban water sector should attract a different regulatory mechanism	12	20		40	28	25
4	An autonomous statutory body is necessary for efficient and effective performance of its functions	72	28	0	0	0	25
5	The governance system of the regulator should be two-tier. The Council or commission and the executing body or secretariat.	52	44	4	0	0	25
6	Government should appoint members of the commission	25	50	12.5	12.5	0	24
7	All members of the executing body including the head should be appointed by the commission through a competitive process.	72	28	0	0	0	25
8	In order to have an effective and efficient regulatory council the Executive Secretary must be a full member of the council.	50	20.8	4.2	25	0	24
9	Consumers should be represented on the board of the Commission	80	20	0	0	0	25
10	Consumer protection watch groups must be established to aid in the process of implementing the regulatory guidelines	60	30	10	0	0	25

11	The independence and autonomy of the regulator can be enhanced if it derives its funding through regulatory fees	88	12	0	0	0	25
	Statement				**YES (%)**	**NO (%)**	**Valid responses**
For the institutional arrangements to effectively promote operational efficiency, the institutional framework should demand for the;							
12	Creation of the regulatory body within its sector ministry as a Department				32	68	25
13	New regulatory body having its own resources (i.e. could ether be a single or multi-sector regulator).				60	40	25
14	Contract out some critical components of the regulation to competent private firms				50	50	25
The autonomy of the regulator would be enhanced if the regulator reports to the;							
15	The Sector Minister				4	96	25
16	The President				28	72	25
17	The Parliament of Ghana				96	4	25

Source: Author's analysis of data

Structure, composition and reporting mechanism of PURC

The Commission engages a wide range of professionals including economists, engineers, accountants Chemists etc. It is composed of;

i. a Chairman
ii. one person nominated by the Trades Union Congress
iii. one person nominated by the Association of Ghana Industries
iv. one representative of domestic consumers
v. the Executive Secretary appointed under section 33 of the Act; and
vi. four other persons with knowledge in matters relevant to the functions of the Commission.

Apart from the Executive Secretary of the Commission, all other members hold office for a period not exceeding five years but are eligible for re-appointment on the expiration of that period. Meanwhile, the President in consultation with the nominating body can remove any member of the Commission for inability to perform the functions of his or her office, for stated misbehaviour or for any other just cause according to Section 5 of the Act. Conspicuously, its autonomy is enshrined in the Act which says that "*the Commission shall not be subject to the direction or control of any person or authority in the performance of its functions".*

Generally, informants were opposed to the existing mechanism employed in appointing Commissioners to the PURC since the Commissioners are appointed by the President, their independence could greatly be compromised. Instead, they suggested that the Commissioners should be appointed through a public call for a Commissioner and going through a transparent appointment processes. However, some informants from the PURC believe that the appointment of the Commissioners by government does not necessary compromise their independence of the functions. Others also disagree with the provision that allows the President to appoint four other persons with knowledge in matters relevant to the functions of the Commission. The reason is that Politician could be appointed to influence major decisions of the commission even though they may have technical expertise to perform as members of the Commission.

While the Chairman of the PURC reports to the office of the President, the PURC is mandated to present a performance report to Parliament annually. Also, it is legally bound to provide audited accounts to the Auditor General annually within six months of the end of a financial year. Staff of the PURC contacted during the investigation support the existing reporting mechanisms. What they do not want to be done is to make the Commission a department with the sector Ministry since that will negatively compromise their autonomy and greatly. PURC enjoys a higher degree of independence and autonomy without reporting to its sector Ministry. Meanwhile responses from the 25 respondent shows that 72 percent of the respondent rejects the existing reporting mechanism of reporting to the office of the President and 96 percent of the respondents prefer that PURC reports directly to the Parliament of Ghana. With the proposal that PURC reports to the sector Ministry, 96 percent disagree.

The responses are summarised in the table below:

Table 4-3 Reporting mechanism for the regulator

Mechanism	Higher likelihood of achieving greater autonomy [%]	Less likely [%]
The regulator reports to the sector Ministry	0	100
Reporting to the office of the President	10	90
Reporting to the parliament of Ghana	96	4

Source: Author's analysis of data

Table 4-3 clearly shows a strong acceptance of respondents for the regulator to report to the Parliament of Ghana since that would further promote the autonomy of the Commission. None agree that PURC reports to the sector Ministry since its autonomy and independence would further be compromised.

The multi-sectoral regulatory function of PURC

The PURC functions as a multi-sector regulatory institution for the urban water utility, Electricity Company of Ghana, the Volta River Authority (VRA) and the Northern Electricity Department of VRA. During the focus group discussions, participants of PURC agreed with the existing institutional arrangements where the PURC functions as a multi-sectoral institution. According to them, the present arrangement allows more effective use of resources of the Commission than splitting these functions among different bodies. For instance, there are some services that are common to both sectors such as legal and consumer care services. Apparently, most of the participants of GWCL also supported the current arrangement but however believed that the Commission gives more attention to the energy sector. Furthermore, out of the 25 respondents to the questionnaire, 68 percent agree that a multi-sector regulatory framework is appropriate because of its cost effectiveness and reduction in the possibility of industry regulatory capture. Figure 4-2 shows the perceptions of respondents on the appropriateness or otherwise PURC as a multi-sector regulator.

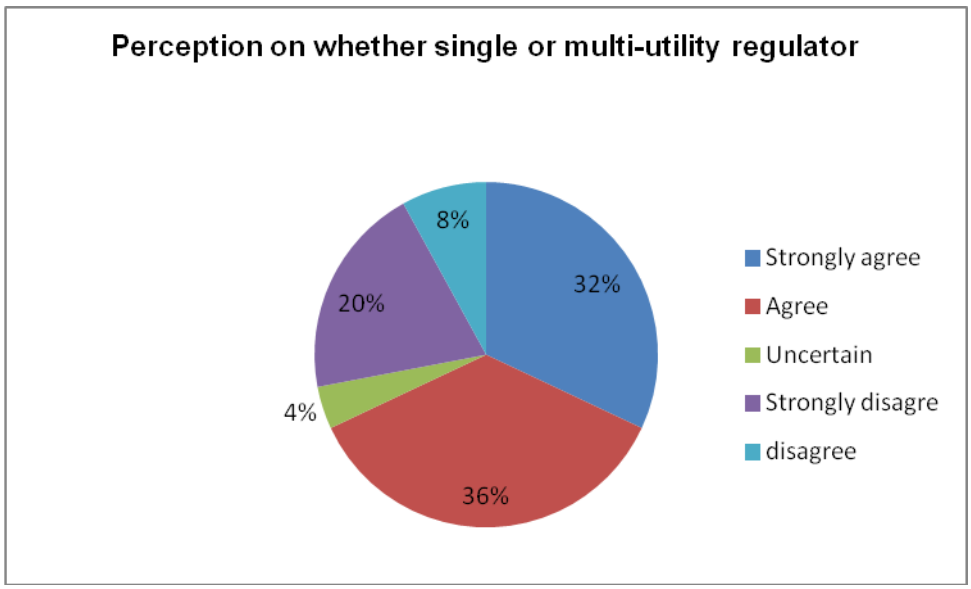


Figure 4-2 Perception on multi-utility regulation

Source: Author's analysis of data

Overall, the results drawn from all sources of data sources in this study triangulate towards the establishment of a separate entity or body to perform the regulatory functions in the water supply sector.

Funding sources for the PURC

Funding sources are clearly defined by the Act that established the PURC. Largely, the PURC is financed through government annual budgetary allocations. However, PURC can also receive funding through the following sources;

i. grants
ii. government subvention
iii. any loans granted to the Commission and
iv. any monies accruing to the Commission in the course of the performance of its functions under the Act

PURC charges no regulatory fees for regulating the utilities even though funding has become a major challenge to PURC. Consequently, the operations of the Commission become difficult. In 2006, the PURC became indicated that it became "*an annual ritual of arbitrary imposition of a budgetary ceiling bearing no relation to the Commission's requirements for effective operation*" (PURC, 2006). Budgets of the Commission continue to suffer from arbitrarily cuts. This has greatly prevented the Commission from

carrying out some of its critical projects and activities. In the same 2006 annual report of the PURC, the Commission hinted that "*the Commission would continue to seek to secure its own funding through the imposition of a levy or regulatory charge on the service providers"*. Presently, PURC is constrained by the current arrangement to adequately undertake its regulatory activities. A discussant from the Commission indicated that "*if the current funding arrangement remains unchanged and budgets approved by the Parliament of Ghana for the Commission continue to be suffering arbitrary cuts in its budgets, then the operations of the PURC will continue to be undermined."*

Nonetheless, the Commission continued to maintain a policy of keeping lean staffing levels and ensures that its key staff are well-trained and exposed to relevant and current regulatory mechanisms since its inception. Unfortunately, the Commission continues to lose some of its best brains as a result of low remunerations for staff compared to analogous institutions making it difficult to retain its staff (PURC, 2005). All respondents suggested that, the independence and autonomy of the regulator can be enhanced if it derives its funding from a regulatory fee or levy instead of being resourced through government budgetary allocations that are woefully inadequate.

Analysis of PURC's level of adherence to the principles of economic regulation

The level of adherence of the regulator to principles of economic regulation in Ghana was subjectively analysed by the author in table 4-4 showing the author's perception of PURC's adheres to the principles of economic regulation.

Table 4-4: Level of achievement of economic regulatory principles of PURC

The regulatory principle of PURC	Definition of the economic regulatory principle	Remarks/Observation
Proportionality	The cost of regulation in relation to funding	Funding is inadequate and done through budgetary allocations
	Regulator seeking to educate the general public and service provider by providing relevant information and embarking on training programmes to build the capacity of service provider instead of seeking to apply sanctions	PURC undertakes stakeholder consultations and also embarks on public education through radio, television programmes and public awareness programmes. Training programmes are organised for staff of GWCL
Accountability	The regulated institutions are made to understand the workings of the regulator	Tariff guidelines for water services are available.
	Feasibility of the service provider to appeal against the regulator's decision.	No specific provision for appeal is available even though such decision are resolved between them
	Availability of an effective and efficient complaint unit that should take care of consumers' complaints	This is clearly spelt out in the legislation. However, the question is how effective the system is.
	The regulator has a well defined role towards the Ministry, President, Parliament and the general public	The Act is specific on the line of responsibility of PURC to the Ministry, Parliament and the general public. However, PURC reporting to the office of the President, is not explicitly stated in the Act

	Customers are involved in the decision processes and other activities of the Commission	At least 3 persons from the Trades Union Congress, Association of Ghana Industries and the representative of consumers represent customers on the Commission. In addition law allows for the establishment of consumer services committees
	The reporting and accounting audit procedures and processes are well defined and followed	The Act clearly defines the reporting processes and procedures and is done in practice excepts that it sometimes delays and difficult to be accessed publicly
Consistency	Consistence in the performance of its functions to the extent that the level of predictability of its decisions removes uncertainties among the stakeholders	It is evident that the PURC has not been consistent over time in their regulatory decisions. PURC failed several times to implement the automatic adjustment tariff formula agreed upon
	Service providers enjoy equal level of attention from the regulator	The energy utilities receive more regulatory focus than water utility.
Transparency	Objectives of the regulator is effectively communicated to all stakeholders	This is available to all and can be found on the regulator's website and annual performance reports
	Stakeholders are consulted before major policy change decisions are taken	Consultations are seldom done as in the case of AVRL.
	The regulated entities clearly understand their obligations	Their obligations are spelt out clearly except that they are sometime not followed
	Decision making processes are made clear and all major decisions taken are made known to the public	The processes cannot be said to be clear in the Act. Some major decisions are never published
	Documents and other relevant information employed during decision making processes are available for public scrutiny.	Only the regulatory tools are available. Much cannot be found on water services
	Performance data on the regulated entities are published regularly	PURC prepares annual reports on the performances of the regulated entities and this is available on their website but not published regularly

	Processes and procedures for appointing Commissioners to the Commission are clearly stated and are competitive	It is clearly spelt out in the Act except that it is not competitive
Services to the urban poor	Availability of a national policy towards ensuring that water services are provided to the urban poor	The PURC has developed a policy paper in that regard
	Incentive packages are given for serving the poor e.g. free or subsidised connections	There have been incentives However, it cannot be said to be consistent and deliberate
	Special programmes specifically designed to benefit the urban poor	Part of the World Bank's US$130 funding for the urban water project was set to extend services to the urban poor
	The tariff structure offers a special tariff regime that is targeted at the urban poor	It is available but only benefits those with connections and with small family sizes
	Evidence of projects done to provide water services in poor communities and informal settlements	Apart from the World Bank urban water project funding, no specific project is directed at improving services to the urban poor
Autonomy	Is a separate regulatory body with its own legal status	PURC is a statutory body
	Functions or responsibilities of the regulator is clearly defined in the Act	PURC's roles are explicitly defined in the Act establishing it
	Security of tenure of the regulatory commission is guaranteed in the law	Tenure is guaranteed by law
	Commissioners and Directors are protected against arbitrary dismissal	No commissioner can be dismissed arbitrarily without resorting to the law
	The commission does not seek a prior approval on a regulatory decision from a government department or Ministry for its implementation.	The Commission takes its own regulatory decisions without reference to government
	Tariff is approved without the interference of government	Even though PURC says it is independent, approval of tariffs are always delayed and sometimes not done due to interference from government

Source: Author

The political environment of Ghana has been stable for almost two decades now. However, the prevalence of poverty in Ghana has exposed the urban poor to many health hazards since access to water by the urban poor continues to pose challenge. The poor pay more for water in the urban areas. Even though some attempts have been made by government through the PURC to address the challenge, the challenge is still enormous. It is however believed that until government deliberately directs its efforts towards ensuring that the urban poor accesses clean water no solution could be seen in sight. According to Franceys and Gerlach, (2008), *"tariff reform is a critical and always politically sensitive element of water sector reform that is clouded in many myths and perceptions"* With the present situation now, the author strongly believes that, the solution resides in a radical policy reform that must have all the political support and commitment and implemented through the regulator.

From all the sources of data employed in this research, results have shown that the existing regulatory framework is acceptable but the Commission needs to exhibit its independence and autonomy from government. Appointment mechanisms used in appointing Commissioners to the Commission were also somewhat accepted generally but was suggested that staff of the secretariat should be taken through a transparent and competitive process to ensure that the competence and expertise of staff are never compromised. Not only that but also, the reporting procedures of the Commission were found to be appropriate. However, the autonomy and independence of the Commission could not be guaranteed as long as it continues to draw its funding from the state. And to ensure its autonomy and full independence the regulator could be financed through a regulatory fee imposed on the utilities it regulates

In investigating the regulator's adherence to regulatory principles, it was found that the PURC could not adhere to all the principles. From the analysis in table 4-4, the commission showed weakness in the areas of transparency, funding, consistency, autonomy and water supply services for the urban poor.

5 The Three Management Models

This chapter discusses performance indicators achieved by each of the three management models: water production and sales, non-revenue water, tariffs, bill collection efficiency, headline efficiency, accounts receivable, profitability ratio, liquidity ratio and creditworthiness ratio of the public urban water provider during the two main periods preceding the AVRL Management Contract and including the private contract. Objective verifiable performance indicators are considered during the analysis based on the available performance data gathered on the water company. Limited performance data availability has been one major limitation to this analysis at this stage.

5.1 Introduction

Ghana Water Sewerage Corporation (GWSC-1966-1998) and Ghana Water Company Limited (GWCL as full service provider-1999-2006) have had the fundamental responsibility for urban water service provision to be supplied in an efficient, effective and sustainable manner. The expectation of the population therefore is to enjoy quality service at an affordable price and anything short of these is unacceptable and must be investigated and addressed. The performance and activities of Ghana Water Sewerage Corporation (GWSC) and Ghana Water Company Limited (GWCL) over the years are analysed in this section to give a baseline of performance that occurred prior to the involvement of the private operator, (AVRL) in June, 2006.

Generally, the task of measuring performances of water utilities could be complex in view of the fact that it is multidimensional. The measurement of individual performance indicators that help in determining the overall performance of a water utility are also accompanied by various kinds and levels of drawbacks most especially in developing countries. Amongst them include; lack of sufficient and reliable data and lack of reliable data sources (Marin, 2009).This study seeks to assess the performance of GWSC/GWCL (before the management contract) and that of the private operator, (under private management) and ultimately determine the net improvements, if any, that the public private partnership has brought to the urban population. However, in making any judgement on the net improvements, the researcher takes into account the fact that different contractual schemes yield different benefits in different environments. Most importantly, because management contracts are limited in scope and time, the

role of the government is crucial in the overall performance of the private operator. Hence the raging debate over the benefits of private partnership in the urban water supply services in Ghana today which concentrates on:

- how much will customers be paying for water tariff as a result of different management approaches?,
- what percentage of the urban population will be served?,
- how effective and effective will the company's operations be?, and
- whether Ghanaians are not capable of managing their own water utility without necessarily involving foreigners or private operator in the urban water sector?

Each model has to be considered taking into account exogenous factors that exist in the environment in which the private operator operates. The pollution of water bodies (i.e. both ground and surface water)by mining companies, farmers and '*galamsey*' operators (i.e. local artisanal gold miners) is on the ascendency and continues to pose both operational and financial challenges to the urban water utility in Ghana. It is seldom reported and very little or no attention is being paid to it by agencies that are responsible for ensuring and promoting the safety of water resources in the country. Presently, the current trends in climate change, population growth, reckless degradation and pollution of water bodies, rural-urban migration and high water demands pose great danger to many developing countries including Ghana and other countries with limited water resources. More challenging times in the urban water sector in the near future is more likely to confront governments, water experts and professionals, operators and water consumers. Often, some intrinsic factors that are normally associated with the growing deficit in water demand and also water tariffs are either ignored or overlooked by water users and the earlier these factors are considered, the better it will be for both water service provider and consumers. Reports of the urban water utility indicate that raising water tariffs are inevitable because of the high cost of water treatments due to the high level of pollution of water sources.

5.2 Data analysis techniques

The analytic strategy or method employed by every investigator is contingent upon his or her own style of rigorous thinking in addition to the adequate presentation of evidence and careful consideration of alternative interpretations (Yin, 2003). Nevertheless, he emphasises the point that, analysis of case study evidence is least developed among other research methods that exist. Bernard, (2006) posits that data analysis begins prior to data collection because the researcher has ideas concerning what he or she is studying and that data analysis is a continuous process. According to Yin, (2009), the process entails the examination, categorisation, tabulation and tests of qualitative and qualitative evidence. Taking into account the objectives of the research, both the qualitative and quantitative data were collected and analysed using different techniques.

Information collected through interviews and public hearings were transcribed and carefully coded into a numerical form. SPSS, Microsoft Word, and Excel were used in transcribing data collected through interviews by capturing different responses by grouping and tallying some of the responses. Further, the data was organised by categorising it into financial, social, technical/operational, political, economic, governance and commercial issues. This affords the investigator the opportunity to identify the relevant information that needed to be focused on. Also, modifications of the research process and alternative methods were done whenever necessary during the research. For instance, after analysing the first data collected during the first fieldwork in Ghana in 2008, it was evident that customer perceptions were not adequately captured. Subsequently, the inadequacies were addressed during the second fieldwork in Ghana in 2010. Exploratory analysis was subsequently undertaken to find out what the data was "saying" and also tried to confirm whether or not the data collected was sufficient enough to produce a good story about the urban water supply management in Ghana. For instance, from the annual reports (including the Cash flow statements, Balance sheets, Income and Expenditure accounts), spreadsheets were generated for both the technical/operational and financial data analysis using Microsoft Excel. This afforded the researcher the opportunity to have a fair idea of what the data was depicting. "*Try to get a feeling for what you have got and what it is trying to tell you*" (Robson, 2002).

The computation and interpretation of financial, operational performances and performances indicators were undertaken based on the standard set of indicators of the International Benchmarking Network for Water and Sanitation Utilities (IBNET, 2009, and 2014). Graphs, ratios, and percentages were employed to depict the performances of the three regimes. Additionally, analysis of variance (ANOVA), t-Tests and Tukey's HSD (i.e. honestly significant difference) tests were employed to show whether or not statistically, there were any differences between the three sample means of the three management models or regimes and their respective periods. Lind and Mason, (1997) posit that while t-Test is the appropriate statistical tool for comparing the sample means of two different populations if the differences are to be determined. Now, ANOVA shows whether or not statistically there are any significant differences in the means where there are more than two means to be compared. In testing the null hypothesis that the means of the three regimes (i.e. populations) are all equal, a single factor or one-way ANOVA was employed. Overall, in deciding on whether or not statistically, significant differences exist in the three sample means, a null hypothesis H_0 (i.e. H_0: $\mu_0 = \mu_1 = \mu_2 = \mu_3$) and an alternative hypothesis, H_1: Not H_0 (i.e. H_1: $\mu_0 \neq \mu_1 \neq \mu_2$ $\mu \neq \mu_3$, or at least one of the means is different from the others), stated at 5% level of significance, where μ represents the mean score of the population. In deciding, if the calculated value F is equal to or greater than the critical value; $F \geq F_{critical}$, then the result is significant at that level of probability and the null hypothesis H_0, is rejected and the alternative hypothesis H_1 is true. Similarly, if the calculated value F is less than the critical value; $F < F_{critical}$, then the result is insignificant at that level of probability and the null hypothesis H_0, is accepted and the alternative hypothesis H_1 is untrue (Lind and Mason, 1997).

Furthermore, Pallant, (2005) posits that, paired-samples t-Test (also known as repeated measures) is employed when a researcher has only one group of people or companies, or machines etc and collects data from them on two different occasions, or under two different conditions. Furthermore, according to (Kothari and Garg, 2014), the distribution of test statistic becomes normal distribution in the case of large samples while sampling distributions such as t-distribution, F-distribution and chi-square distribution are used for small samples as in the case of this research. Therefore, in comparing the performances of the three regimes of the same public water utility under different management models, and establishing whether or not there were any significant differences regarding their mean performances, t-Test was considered the most appropriate statistical tool to apply as matched pairs of mean performance

indicators of each of the regimes were matched with the same performance indicators of other regimes. Here, scores on a continuous measure were compared for each pair of indicators. Also, the paired-sample test was chosen as it afforded the researcher the opportunity to compare various performance indicators of the public urban water utility under different management models and periods (i.e. between GWSC and GWCL, GWSC and AVRL and GWCL and AVRL). Results for the paired-samples t-test was presented using the name of the test, the purpose of the test, the t-value, the degrees of freedom (df), the probability value, and the means and standard deviations for each of the regimes.

Tukey's multiple comparison test, also known as Tukey's honestly significant difference (HSD) constitutes one of several tests that a researcher can employ to determine which means among a given set of means differ from the rest. With only two groups of observations one could compare the two group means using a t-Test and with more than two groups, it is inappropriate to simply compare each pair using a t-test because of the problem of multiple testing. In order to perform this type of analysis correctly a one-way analysis of variance (ANOVA) is usually used to evaluate whether there is any evidence that the means of the populations differ. For instance, if the ANOVA leads to a conclusion that there is evidence that the group means differ, it becomes necessary to further investigate which of the means are different. Hence the use of Tukey's multiple comparison test. While the ANOVA tells whether groups in the sample differ but and cannot tell which groups differ, Tukey's HSD specifically clarifies which groups among the sample have significant differences. Therefore, Tukey's HSD tests were performed to conduct further data analysis in order to maintain integrity which were tests that were never pre-planned. Statistically, like both the t-test and ANOVA, the Tukey's multiple comparison test, assumes that the data from the different groups come from populations where the observations have a normal distribution and the standard deviation is the same for each group.

The Statistical Package for the Social Sciences (SPSS) was employed in computing the HSD values representing the minimum distances between two group means which must exist before the difference between the two groups can be said to be statistically significant. From the Tukey's HSD table, the Sig value is read across each row and the Sig. value determines whether or not the two conditions that are being compared are significantly different. Now, where conditions are significantly different, their Mean Difference values in the corresponding rows have a star (*). In the case where the Sig

value is greater than 0.05 it is concluded that statistically, there is no significant difference between the two conditions that are being compared and therefore can conclude that the differences between condition Means are likely due to chance. Conversely, if the Sig value is less than or equal to 0.05, it is concluded that there is a statistically significant difference between the two conditions that are being compared and therefore can conclude that the differences between condition Means are not likely due to chance.

Finally and additionally, longitudinal comparator analysis was undertaken for various regimes (GWSC at least 10 years, GWCL, 7 years and AVRL, 5 years) in assessing the performance of all three management models. The financial and operational performance indicators however constitute a major component of the process of the data analysis. Inflation rates were obtained from Ghana Statistical Service and used to generate the conversion factors employed in converting all nominal financial data into 2011 real prices and subsequently converted into constant Dollar prices.

5.3 Performance evaluation of Ghana Water and Sewerage Corporation (GWSC, 1965-1998)

The researcher has striven to collect published data from as early a date as is possible. The quality and coverage of this information is necessarily mixed – however it does now appear to be more complete than anything available from GWCL or other sector institutions. The following sections are based upon this information, primarily from GWSC Annual Reports, sometimes reported through various consultants' studies.

5.3.1 Efficiency and effectiveness, GWSC

One major intriguing operational challenge that has continued to confront the national public water utility has always been the large volumetric discrepancies that exist between the quantity of water produced and water sold. Evidently, annual water productions of Ghana Water and Sewerage Corporation from 1987 to 1998 have fluctuated between 159.3 million cubic metres in 1988 and 191 million cubic metres as shown in figure 5-1 below. Between 1989 and June, 1998, the World Bank Credit 2309GH was employed for the rehabilitation of 33 systems out of the

existing 210 systems and this led to the completion of most of the rehabilitation and capacity building projects in Ashanti, Volta, Western, Central, ATMA and Brong Ahafo regions (GWCL., 1998)). Funding of rehabilitation projects was undertaken by other institutions and governments during the same period, to improve the performance of the public water utility in Ghana. For instance, in 1996, GWSC undertook a number of rehabilitation works throughout the country to improve service delivery. Notable among these projects were the Accra-Tema Metropolitan Area (ATMA) rehabilitation project supported by AFDB, Italian Government and the Nordic Fund; GWSC Assistance Project for the Northern Regions supported by CIDA, the Water Sector Rehabilitation Project for 33 large-scale urban water systems serving about 6.18 million throughout the country.

Largely, the completion of most of the rehabilitation and capacity expansion projects undertaken in 1996 account for the steady increase in water production after 1994 from 186 million cubic metres in 1995 to 191 million cubic metres in 1996.

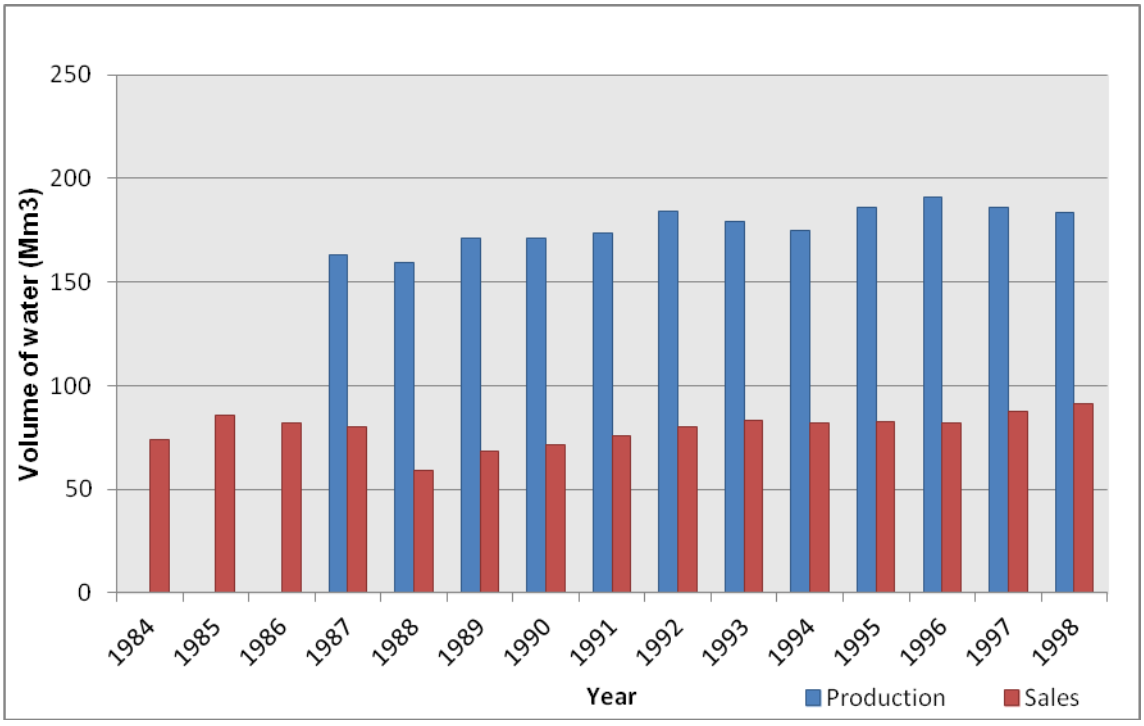


Figure 5-1 Water production (1987-1998) and sales (1984 – 1998), GWSC

Now, rehabilitation of the transmission pipeline from Tema to Kpong, extension of water supply to Pantang junction and Adenta Estate (SSNIT flats), Bamag plant at Weija, Techiman and Konongo water supplies, Candy plant at Weija, and 17 No.

pumping station in ATMA were all completed and commissioned in 1996 (GWSC, 1996).

Technically, various factors account for the fluctuating trend in the annual water production from 1987 to 1998 including the drying up of raw water sources, frequent plant and equipment breakdowns, rehabilitation works, installation of production meters for accurate measurements, and frequent power outages. A case in point was the corporation's failure to transfer 105 small water supply systems to Community Water and Sanitation Division earmarked to take place in 1998 and the Water Sector Rehabilitation Projects in the same year resulted in the increase in the operational systems from 182 in 1996 to 190 in 1998 but conversely resulted in a decrease in the annual water production in 1998 due to natural factors including the drying up of raw water sources, frequent power outages, (Ghana experienced load shedding nationwide in 1998) low voltages, and the installation of production meters leading to the capturing of actual production figures in lieu of estimates (GWSC, 1998).

A key indicator therefore is Non-revenue water (NWR), defined as the difference between quantity of water supplied and water sold (i.e. volume of water "lost"). It is expressed as a percentage of net water supplied and represents the water that has been produced and "lost" before it gets to the customer through leaks, theft, and legal usage for which no payment is made (IBNET, 2011). For over a decade (from 1987 to 1998) GWSC recorded significantly high levels of non-revenue water as shown in figure 5-2.below.The operational effectiveness and efficiency of GWSC has largely been exposed during the period in figure 5-2. Throughout the 12-year period (i.e. from 1987 to 1998),non-revenue water ranges between 51 and 63 percent.

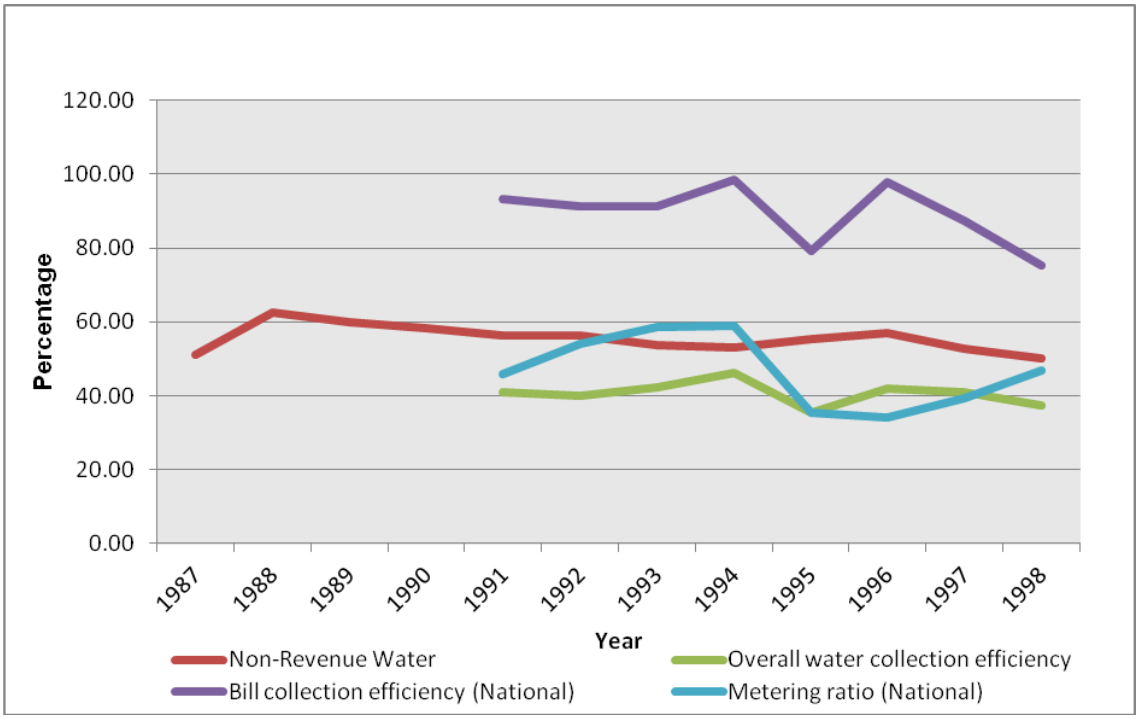


Figure 5-2 NRW, Metering & Bill Collection Efficiencies, GWSC

This implies that consistently and notoriously, more than 50 percent of water produced during the period had been lost. In its commercial sense, more than 50 percent of the utility's water revenue was lost except in 1988. "Technically, a high non-revenue water level depicts a poorly-run water utility that lacks governance, autonomy, accountability and the technical and managerial skills necessary to provide a reliable service" (Liemberger et al, 2009).

Physical and commercial losses are the two elements that constitute non-revenue water (NRW) stemming from leakage due to ageing and obsolete networks, pipe burst, illegal connections, lack of effective monitoring, lack of regular updating of customer data, corruption on the part of some unscrupulous officials of the utility who may aid some consumers to do illegal connections and low metering. It is estimated that physical and commercial losses constitute 30 and 20 percent of the non-revenue water respectively in the case of GWSC. Partly, low metering in 1996 contributed to the high non-revenue water of 57 percent (GWSC, 1996). Meanwhile, a metering program embarked upon by the water utility in 1996 by procuring and installing 93,500 consumer meters and 67 production meters partly accounted for the reduction in non-

revenue water recorded in 1998 from 53 percent in 1997 to 50 percent in 1998 (GWSC, 1998)

Finally, the product of water sold (calculated as a percentage of water produced) and bill collection efficiency technically defines the overall collection efficiency of the utility. This is because, it helps to integrate, encompass and express the totality of all operational/technical, managerial, commercial and financial efficiencies and effectiveness of the utility. Averagely, the utility's overall collection efficiency from 1991 to 1998 was 40.7 percent and thus exposes the general abysmal performance of the water utility during the period.

Customer metering

Metering ratio as a performance indicator, expresses the percentage of metered consumers to the total number of consumers served by a water utility. It indicates the effectiveness of the metering installation strategy employed by the utility. Both physical and commercial components of the losses incurred by GWSC during the period under study have been indeterminate due to lack of sufficient meters for water consumers and lack of production meters. As shown above, from 1991 to 1998, less than 60 percent of water customers were metered with metering ratio ranging between 34 percent and 59 percent in 1996 and 1994 respectively. A sharp decline in metering ratio from 98.5 in 1994 to 79.4 in 1995 was as a result of significant increases in customer base without a corresponding increase in meter installation. Even though the utility's management in 1995 attempted to improve upon the low metering ratio by ordering more meters for installation, the meters could not be delivered and therefore worsened the metering situation in 1996 where about 6,751 new customers were added to the existing customers and 33,692 defective meters were recorded during the same period.

Billing and collection efficiencies

Billing and bill collection efficiency are crucial and are major determinants of financial performance and for that matter the sustainability of any water utilities. Significantly, bill collection efficiency affects the financial health of all water utilities to a large extent; hence, utilities that perform poorly in billing and collection inevitably suffer major

financial drawbacks. Fundamentally, billing requires a good record-keeping on customers such that the quantity of water consumed by all consumers and their respective locations are known for effective billing, collection and monitoring. However, this study has revealed that data management during the period had been very poor due to lack of computers and other logistical support needed for generating accurate data on customers. This challenge was evident during data collection as it became very difficult for the researcher to collect data on this period (especially for the years 2004 and 2005). Nevertheless, during the fieldwork, some informants (i.e. staff of the water utility) intimated that, billings were sometimes done based on mere guesstimates and therefore majority of customers were billed using “flat rates” or estimates regardless of the volume of water a customer consumed. Also, some technical officers collude with customers to conceal household sizes for the estimates.

The implication is that, while some customers are under-billed far below their actual consumption, others are over-billed. In such situations, some unscrupulous unmetered customers may be encouraged to engage in the illegal sale of water to neighbours and other consumers that would be without water at the expense of the water utility -a practice that is very much prevalent in the Ghanaian society today. Unfortunately, it has become business as usual and therefore a major source of income to some unscrupulous unmetered customers of the water utility– a situation that prevails in all three cities used for the study.

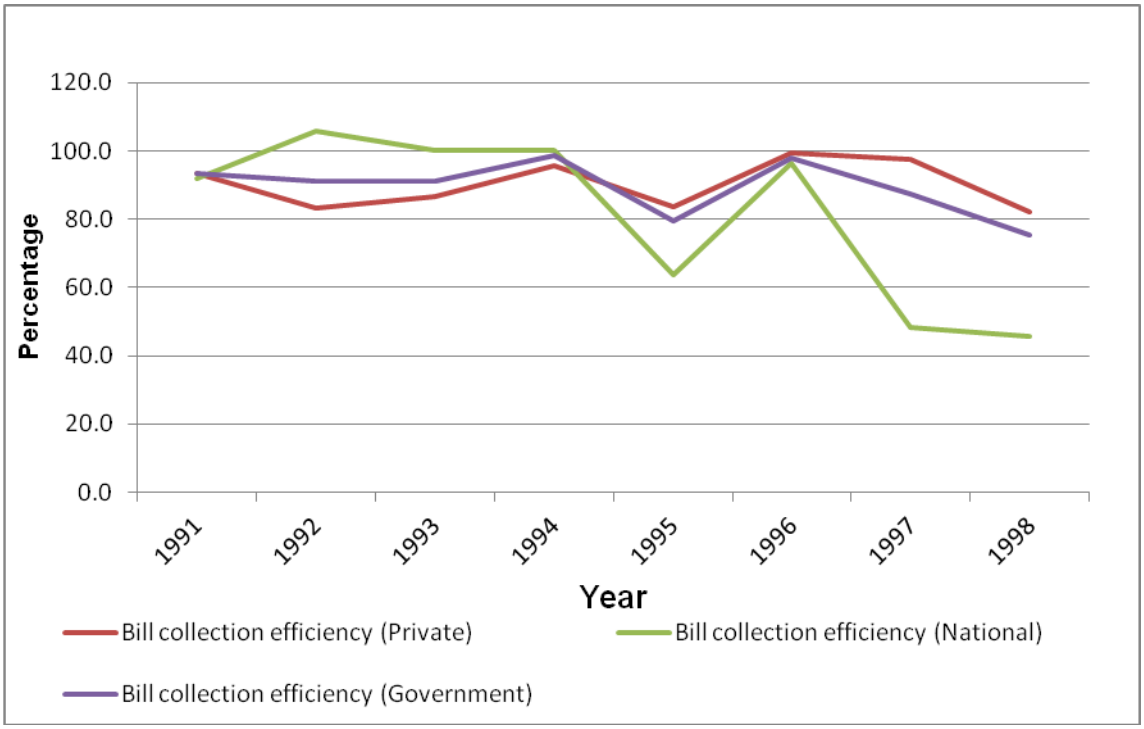


Figure 5-3 Bill collection efficiencies, GWSC

According to Marin, (2009), the task of accurately measuring water losses is notoriously complex. For over a decade, (i.e. from 1987 to 1998) less than 50% of the water produced was sold. Also exacerbating the problems of GWSC is the low bill collection efficiencies exhibited by the water utility over the years. Except in 1996 when bill collection efficiency hit 98 percent, average bill collection efficiency was approximately 89.3 % from 1991 to 1998. It is however worthy of note that Government's non-payment of bills of Ministries, Departments and Agencies (MDAs), the culture of customer's unwillingness to pay water bills readily and long billing cycles significantly account for these low collection efficiencies. Here, customers' unwillingness to pay water bills might partly be influenced by long billing cycles and poor quality of service since customer will only be willing and ready to pay their bills whenever quality services are provided and guaranteed. Marin, (2009) asserts that it is common for poorly performing public utilities to have low bill-collection rates due to lax enforcement and the fact that people resent paying for poor services. Usually, issues relating to culture of non-payment of bills once developed take time to undo and in this case, customer orientation and education could provide a good remedy.

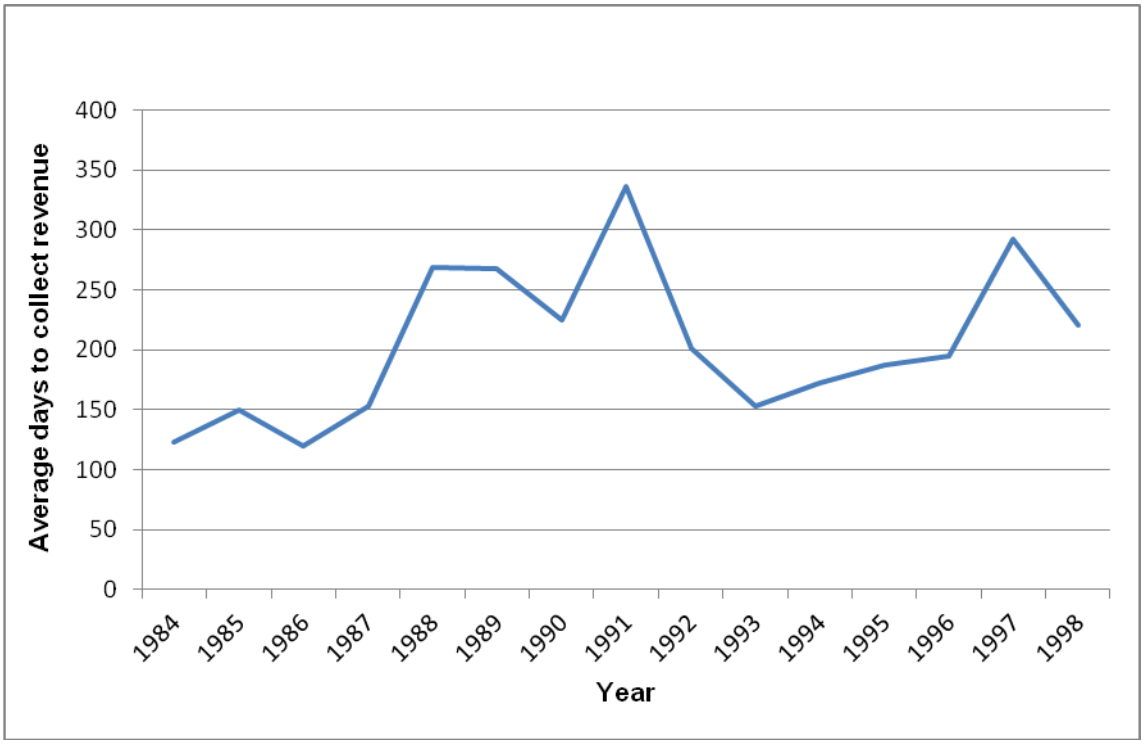


Figure 5-4 Days receivables ratio, GWSC

The enforcement of government's policy to decentralise payment of utility bills of MDAs in 1996 without the necessary budgetary provisions, efforts and support to financially empower the MDAs to pay their bills, resulted in the decline in bill collection in 1997 and consequently increased the average collection period and further worsened in subsequent years as shown in Figure 5-3.

In 1998, a private company, Messrs Delaram was engaged to recover the arrears of the corporation in order to improve the corporation's commercial operations in the areas of meter reading, bill distribution, arrears collection and prepayment metering and this resulted in the collection of 563 million cedis within six months from June 1998 (GWSC, 1998). Also, more than 2 billion cedis was collected as part of the arrears of MDAs in 1998. A tariff increase of 130 percent granted to GWSC by the newly established PURC in 1998 improved both billing and collection figures during the year in terms of cash over the previous year. Meanwhile, overall collection efficiency declined further in 1998 due to government's failure to pay about 65 percent of bills of MDAs. Albeit government pays its bills, payments are usually unduly delayed thereby sometimes showing bill collections of government above 100%. While one may agree

with the above reasons, lack of adequate bill collection centres greatly account for the low bill collection efficiencies for the private customers.

5.3.2 Financial ratio analysis, GWSC

Liquidity

Inevitably, the availability of sufficient liquid resources is crucial to the survival of water utilities if they are to meet their current and maturing obligations. However, it is worth-noting that different businesses require different current ratios for analysing a company's financial performance. Here, the liquidity ratio employed in examining the relationship between the liquid resources of GWSC available and the current liabilities is the current ratio expressed as the ratio of the current asset to the current liabilities of the water utility. For a water utility, a current ratio of 2:1 is considered desirable.

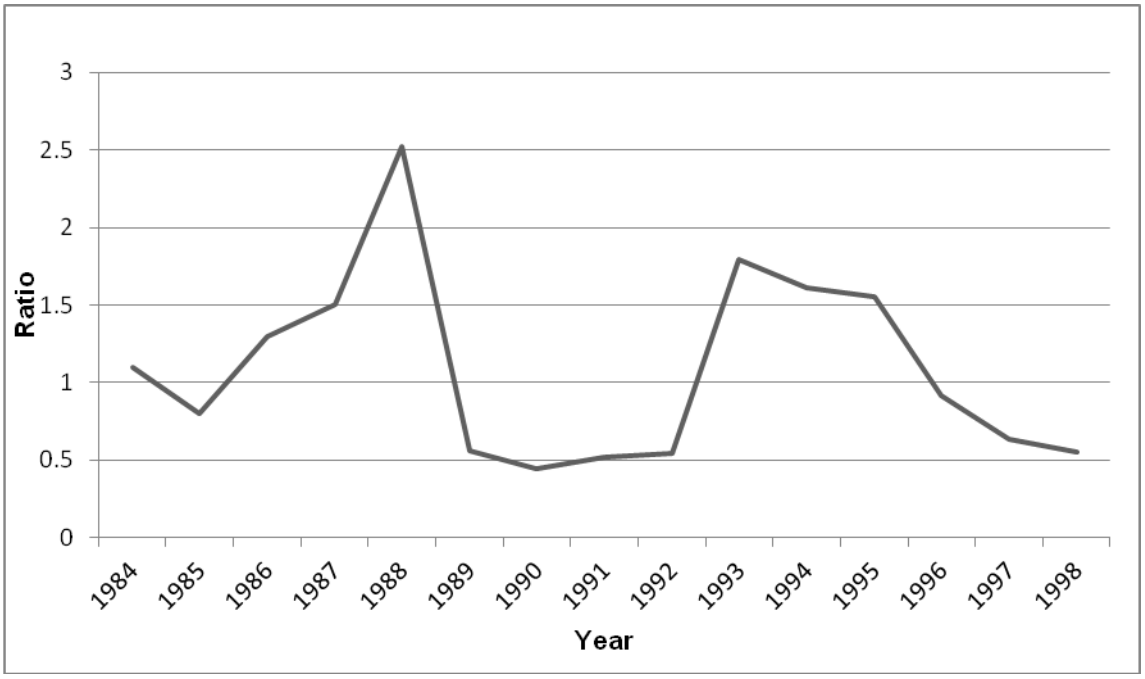


Figure 5-5 Liquidity ratio, GWSC

The graph above depicts the Corporation's short-term solvency for a period of one and a half decade, (i.e.1984-1998) that could best be described as extremely low except in 1988 when the utility's current ratio was 2.52 but with high corresponding accounts receivable of 9 months The implication is that, even though the figures show that the

utility was liquid in 1988, funds were tied up in cash due to high receivables and therefore could not be used productively. The Corporation's liquidity position sharply worsened after 1988 to a low of 0.44 in 1990 and only improved to 1.79 in 1993 and then declined again from 1994 till 1998.The Corporation's attempt to increase the current liability during this period in order to sustain its operations coupled with high inflations and exchange losses, greatly affected the liquidity position of the utility. Additionally, the closure of the World Bank Credit GH2039 compelled the corporation to resort to short term borrowing in view of sustaining the Water Sector Rehabilitation Programme worsened the liquidity position in 1998. High exchange rates due to inflation and low collection efficiency leading to high receivables to a large extent contributed to the financial stress that the Corporation experienced throughout the period. Overall, the liquidity position of GWSC could best be described as quivery during the period and thus significantly affected the utility's operations making it extremely difficult for the utility to repay its foreign loans and also pay for its imports.

Operating ratio

Operating ratio is expressed as a ratio of the operating expenditure to operating income and usually employed to determine how much is left to cater for non-operating expenditures. According to Franceys, (2007), an operating ratio of 60 percent or less is considered desirable for water utilities. Thus, at least 40 percent of a water utility's revenue is required to take care of non-operating expenditures of a water utility. GWSC had unacceptable levels of operating ratios throughout the 15-year period (i.e. from 1984 to 1998) and had its best operating ratio of 66.3 percent in 1995 and its worst ratio of 205 percent in 1985. With the sky-rocketing levels of inflation in the early parts of the 1980s which reached a climax of 142 percent in 1983 (IMF, 2011), controlling energy cost and chemicals that were imported in US dollars became extremely difficult. Except in 1993 and 1995, when the operating ratios were 69 and 66 percent respectively, the entire period recorded high ratios above 71 percent. This explains the large negative net margins recorded by the Corporation.

Not only that but also, the Corporation's production and general administration costs components constitute approximately 75 percent of the operating expenditure with energy costs having more than 50 percent of the production costs. Comparatively, between 1997 and 1998, electricity and chemical costs registered almost 100 percent increase and therefore any attempt to control both the chemical and electricity costs

would ultimately and automatically reduce the operating and consequently make available sufficient cash for non-operating expenditures.

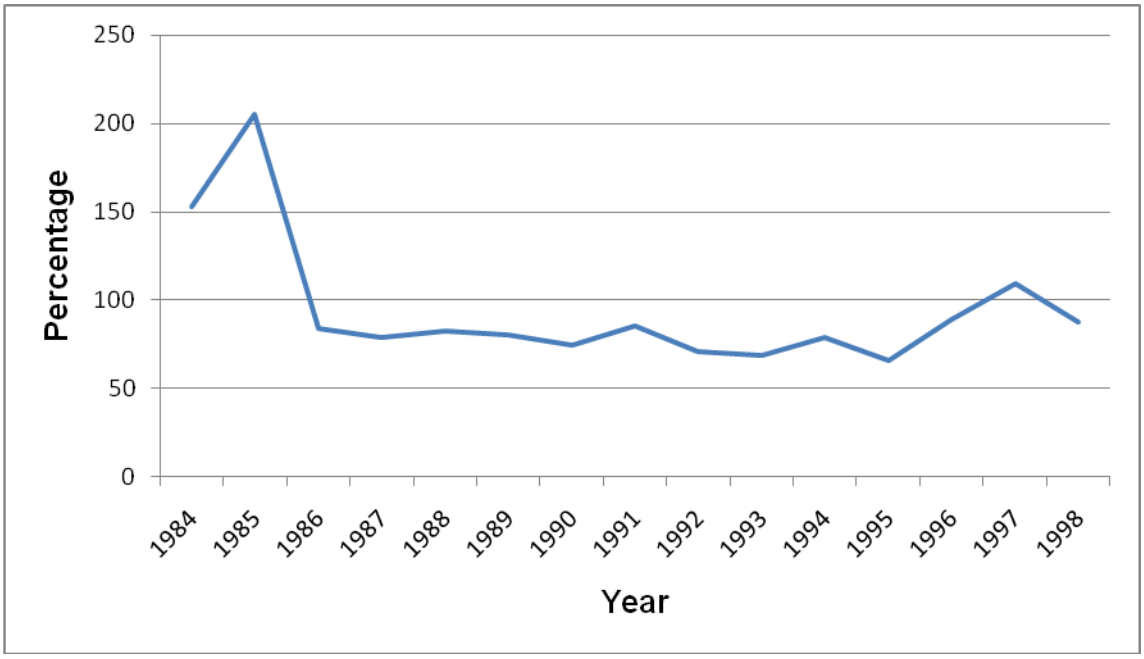


Figure 5-6 Operating ratio, GWSC

Profitability

The growth and sustainability of a business are contingent upon the management's ability to control spending judiciously so as to earn a return on resources that have been committed towards the business. In this study, the performance indicator employed in measuring the level of profitability of GWSC is its return on fixed assets (ROFA) which shows how profitable the corporation is relative to its fixed assets. Depending on how prudent resources of a utility are employed, an operating surplus or deficit could be generated. In this case, a profitability ratio between 6 percent and 8 percent may be considered desirable for a water utility such as GWSC.

Successively from 1994 to 1998, GWSC recorded deficits with its return on fixed assets (ROFA) ranging between -9.69 percent in 1994 and -1.03 percent in 1998 respectively. It is significant to state here that, both endogenous and exogenous factors have accounted for this abysmal performance of the corporation. In 1994, revaluation of the corporation's assets which raised the value of its assets by 800 percent which automatically increased the depreciation charges thereby making losses before the

additional taxes and interest charges were considered hence leading to the abysmal losses that it incurred in 1994. Meanwhile, three unprecedented upward adjustments of tariffs of 44 percent, 20 percent and 10 percent in March, April and July 1995, respectively also gave a remarkable increase of 66.3 percent in water revenue over that of the previous year from 19.9 billion cedis to 33.09 billion cedis in 1995. Coupled with a reduction in its operating ratio from 79 percent in 1994 to 66 percent in 1995,its operating deficit reduced significantly in 1995.

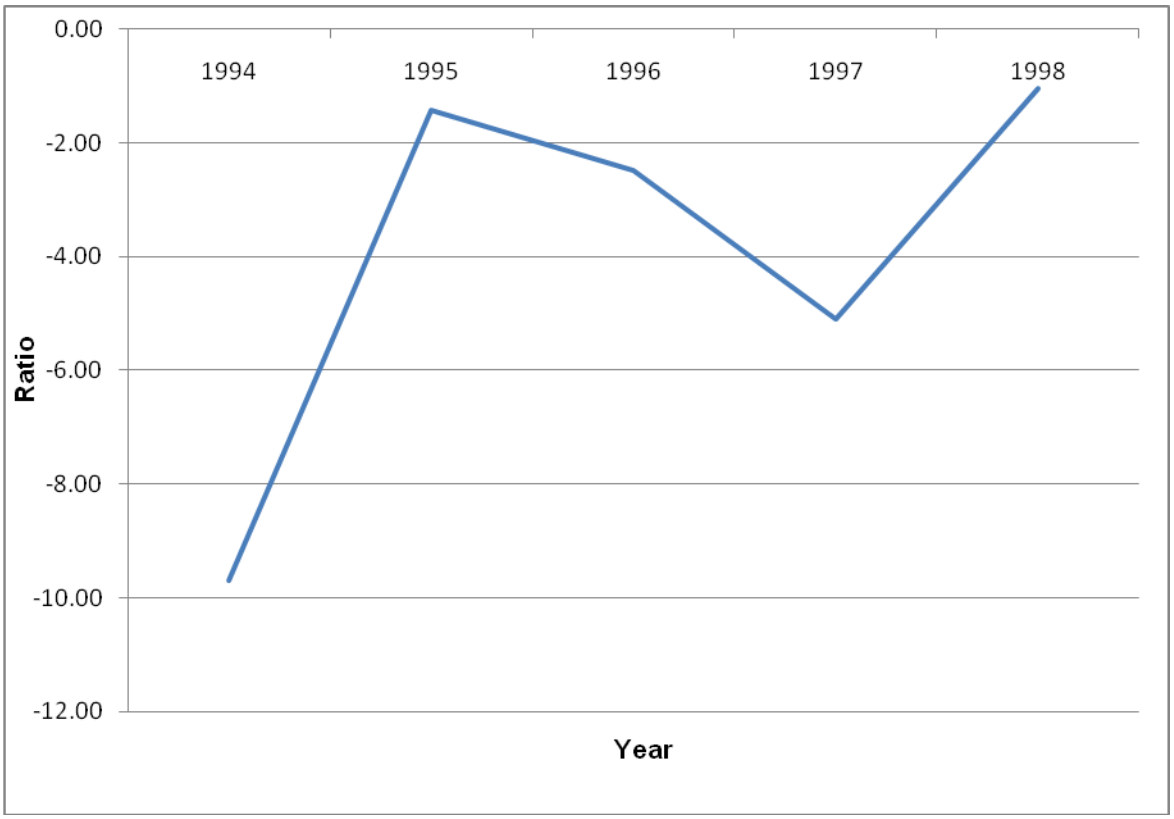


Figure 5-7 Profitability ratio, GWSC

Between 1994 and 1997, it is intriguing to note that while operating expenditure of the utility increased by 173.9 percent, its total revenue increased by only 96.2 percent (GWSC's Corporate Plan, 1999-2001). Nonetheless, the establishment of a regulatory body (i.e. Public Utility Regulatory Commission) in 1997 somewhat helped improve the worsening financial position of GWSC when it approved a 130 percent tariff increase which reflects in the Corporation's profitability in1998.

By and large, undue political interference had influenced the performance of GWSC to the extent that it could only increase water tariffs upon ministerial approval which in most cases delayed for several months and in some cases, more than a year (Amis, 1998) even though, section 4 of Act 538 establishing the PURC makes it explicitly independent and autonomous. Not until March, 1998 when the GWSC was granted130 percent tariff increase, water tariffs either lagged behind average unit cost of production or were at par. The graph below clearly displays the deficit gap between average tariff levels and unit costs of water produced between 1989 and 1998.

Taking into account the difference between the average tariff and the average cost of water sold, it clearly exposes a high level of inefficiency in the system during the period. With more than 54% non-revenue water at the time, raising tariffs will not necessarily or automatically translate into the utility's ability of achieving cost recovery. In such a case, where both commercial and operational/technical inefficiencies are significant (i.e. in the area of billing and collection and high non-revenue water losses), increasing tariff levels as a means of achieving cost recovery may only make customers to pay for the inefficiencies of the corporation.

To achieve full cost recovery, the tariff must be able to take care of the utility's operating expenditure, capital maintenance expenditure and the capital costs. Here, the average unit cost of production may be expressed as the **total expenditure** divided by the **total volume of water produced** while the average unit cost of water sold is expressed as the **total expenditure** divided by the **total volume of water sold**. Average tariff is however defined as the **total billing** divided by the **total volume of water sold.**

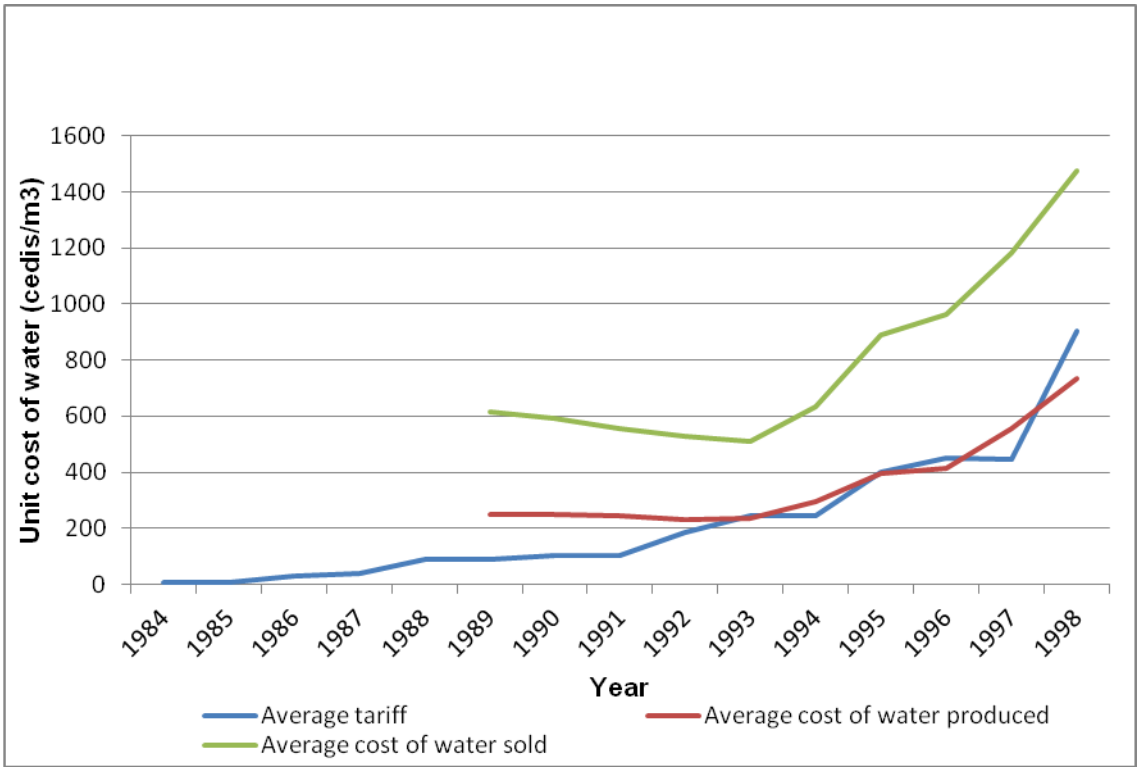


Figure 5-8 Average tariff versus average unit cost of water production and sales, GWSC

The difference between the average unit cost of water produced and that of water sold gives the average unit cost of water that is unaccounted for. As depicted in the figure 5.8, while the gap between the unit cost of water produced and the average tariff has been marginal, the gap between the average tariffs and the average unit cost of water sold was significantly wide and thus exposes the gross inefficiencies in the operations of the corporation.

Creditworthiness

The ratio of the corporation's long-term debt to the shareholder's equity defines the utility's debt to equity ratio and the higher the ratio, the riskier the business. Here, the level or magnitude of long-term loans investment of GWSC is analysed using its leverage and from the graph below, the debt to equity ratios exceed 100% in 1997 and 1998 showing that majority of the utility's assets were financed through debts having the best leverage of 15.45 percent in 1994 since 1991.In the 1990s, the depreciation of the cedi against most major currencies coupled with the high rising exchange rates, translated into high exchange and interest losses on its debts.

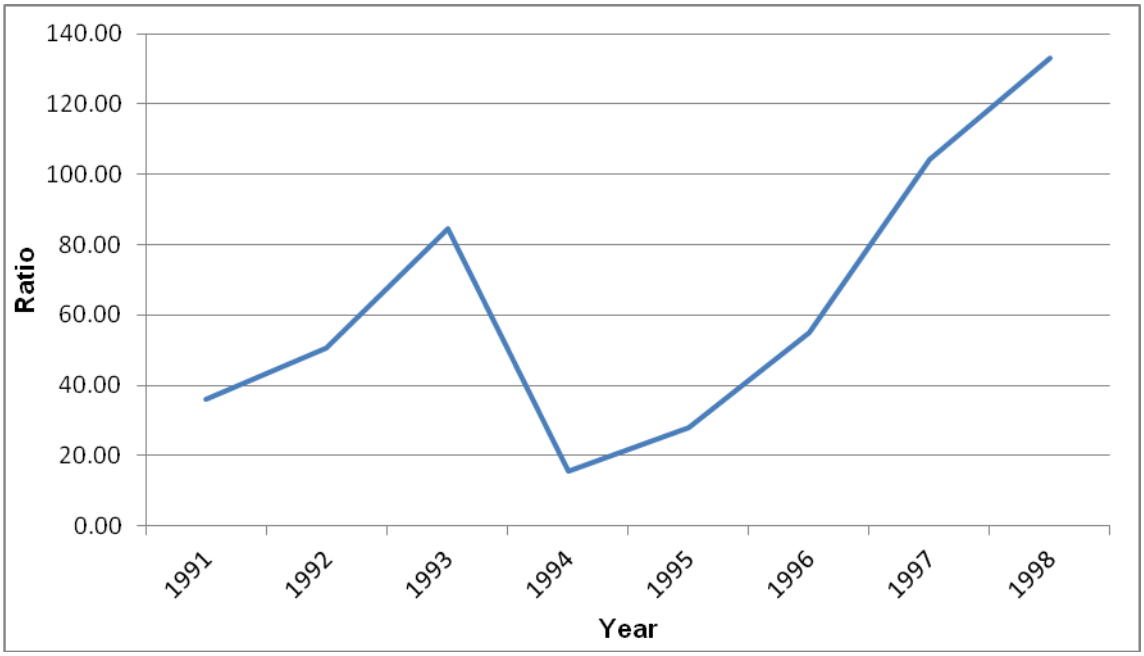


Figure 5-9 Leverage, GWSC

With the increasing levels of investment in 1995 and 1996 through loans and grants coupled with low collection and a sky-rocketing annual inflation rate of 70.8 percent in 1995, debt-to-equity ratio significantly worsened after 1994.

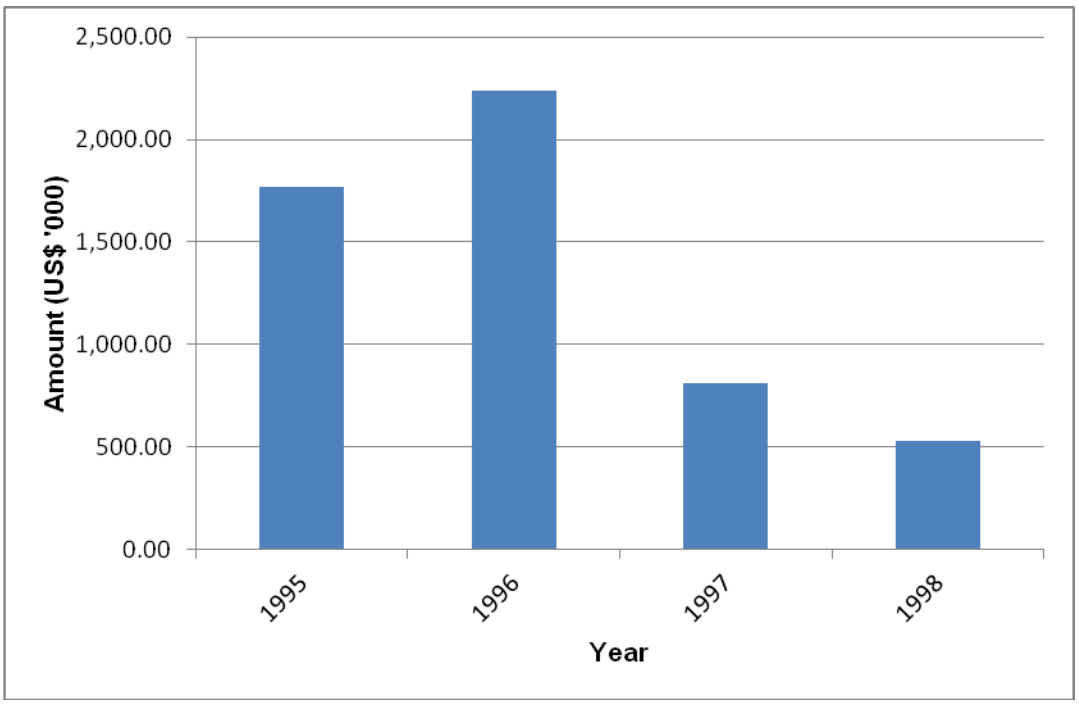


Figure 5-10 Level of Investment, GWSC

Subsequently, investments greatly declined after 1996 as shown in the figure 5-10 above.

5.3.3 Human resource management of GWSC

Labour productivity and staffing levels

Labour productivity ratio is defined as the number of staff members per thousand customers served. From figure 5-11 below, GWSC recorded high labour productivity ratios between 26 in 1991 and 18 in 1998 due to overstaffing without the corresponding increases in customer base through coverage expansion. One major challenge that has bedevilled most public institutions in Ghana is the institutionalised political patronage since independence and GWSC was not spared. Undoubtedly, very little gains were made in the corporation's labour productivity ratios during the 8-year period under study.

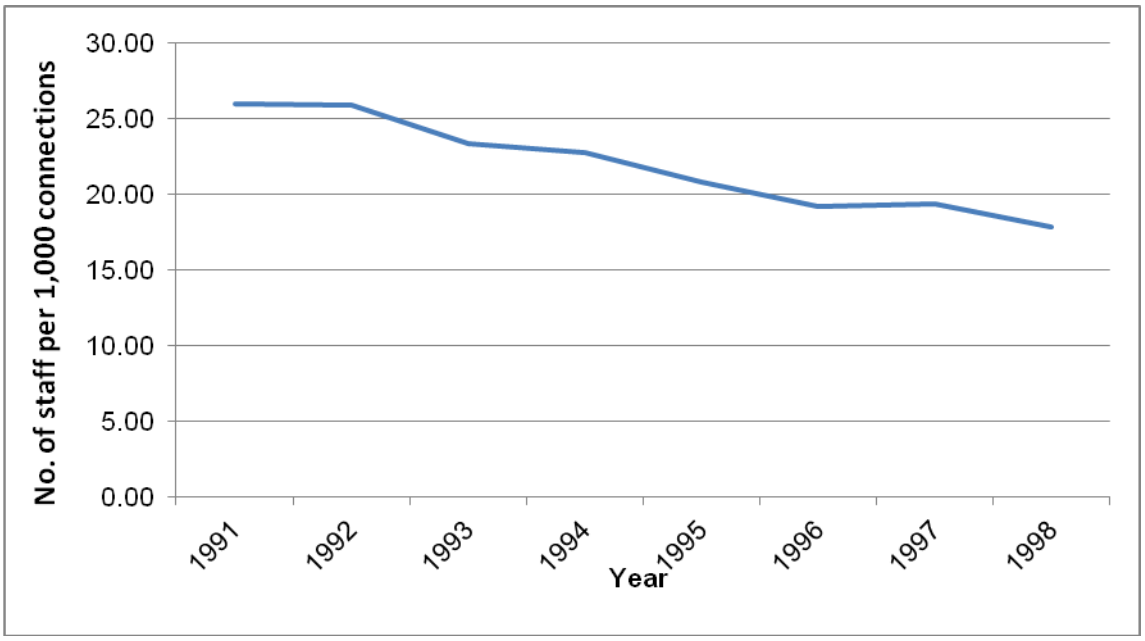


Figure 5-11 Labour productivity ratio, GWSC

Labour productivity stood at a dismal ratio of 26 employees per 1,000 customers in 1991 and with very poor work practices. Albeit, a Manpower Improvement Programme was instituted in 1991 to redeploy redundant staff, recruit identified professionals and also motivate and retain staff somewhat improved the utility's labour productivity of

GWSC, it was unsuccessful. For instance, its staff strength at the close of December, 1995 stood at 4,284 compared to 4,349 at the inception of the programme. However, in 1996, the corporation vigorously pursued a three-pronged programme and that led to a further reduction in the number of staff through the limitation of fresh recruitment to essential categories of staff only. Consequently, staff strength marginally decreased from 4,284 to 4,198 while customer strength increased from 205,685 in 1995 to 216,748 in 1996 respectively thereby further but marginally improving its productivity ratio to 19.2 in 1996.

On the contrary, a review of the corporation's staff establishment/structure to reflect the needs of the utility in 1996 by a task force found out that a staff strength of 3,980 was most appropriate at the time. In spite of the restriction placed on fresh recruitment during the period to special categories of staff, financial constraints made it impossible for the scheduled retrenchment of low productive staff to be effected. Hence the targeted staff strength of 3,980 could not be achieved. Again in 1998, the staff strength of the corporation marginally increased by forty eight new workers from the previous year standing at 4,226. It is however worthy of note that system expansion and rehabilitation projects undertaken in 1995 through to 1997 helped in improving the labour productivity of the corporation since more customers were added as a result of the expansion of the system.

Staff training

GWSC had implemented a Manpower Improvement Programme that sought to ensure a continuous improvement of operational efficiency of its human resources as an essential software and catalyst for the operational inputs of the corporation. Consequently, the programme attracted highly qualified personnel and helped fill technical/professional and other strategic positions (GWSC, 1995). In 1996, more than 20 percent of its labour force was offered various forms of training to equip and motivate staff for their tasks. Both locally and overseas, employees undertook various courses to top-up their skills. Most of the revenue staff in charge of customer care and technical staff in charge of Overseas Economic Co-operation Fund (OECF) were supplied with workshop equipment and trained locally in 1998 (GWSC, 1998).

5.4 Performance evaluation Ghana Water Company Limited (GWCL, 1999-2006)

As part of government plans to invite a private operator into water supply operations on an enhanced lease basis, a preparatory work to transfer 105 out of 210 systems to the District Assemblies/Communities for community management was undertaken and completed by the end of 1998. Additionally, a number of studies were undertaken including the willingness and ability to pay, tariff structure, water quality and assets valuation. More significantly, by way of ensuring a successful implementation of the various phases of the programme in future, a Transaction Advisor was appointed (GWSC, 1998). Finally, in pursuant to the Statutory Corporation's Act, 1993 (Act 641) as amended, GWSC in 1999 became a limited liability company under a new name, Ghana Water Company Limited (GWCL).

Subsequently, due to this conversion, the capita structure of the company completely changed and therefore was registered with an authorised capital of GH¢ 200 billion shares of no par value and an issued capital of GH¢ 12.5 billion (i.e. GH¢ 12.5 billion shares) (GWCL, 1999). Inevitably, major changes were made in the composition of company's board membership including the chairman and with the appointment of a Deputy Managing Director for operations, the company had its full complement of top management to effect the needed change at the time.

Water production and sales

At the outset of 1999, GWCL operated 215 systems but transferred 115 smaller systems to the some District Assemblies/Communities for community management in the course of the year as part of the Water Sector Restructuring Programme (GWCL, 1999). Nonetheless, it is worthy of note that, a transition period of one year was agreed upon for GWCL to continue to be responsible for the operation of these systems until the communities were ready to take over the management of these systems. Since the inception of the Water Sector Rehabilitation Project in 1990, water production had been fluctuating.

Not until 2002, water production levels could not exceed the production level of 1999 which stood at 197 million cubic metres. However, the 6 percent increase in water production over the 1998 water production level of 183.6 million cubic metres is attributable to the near completion of the water rehabilitation projects. During the year, Water Sector Rehabilitation Projects in Tamale and Wa funded by OECF and executed by Sogea and the South-East District water Supply Project funded by ODA, ECGD and GOG for the treatment of water for supplying water to Ada, Sogakope, Keta, Anloga and other surrounding areas were completed and commissioned (GWCL, 1999).

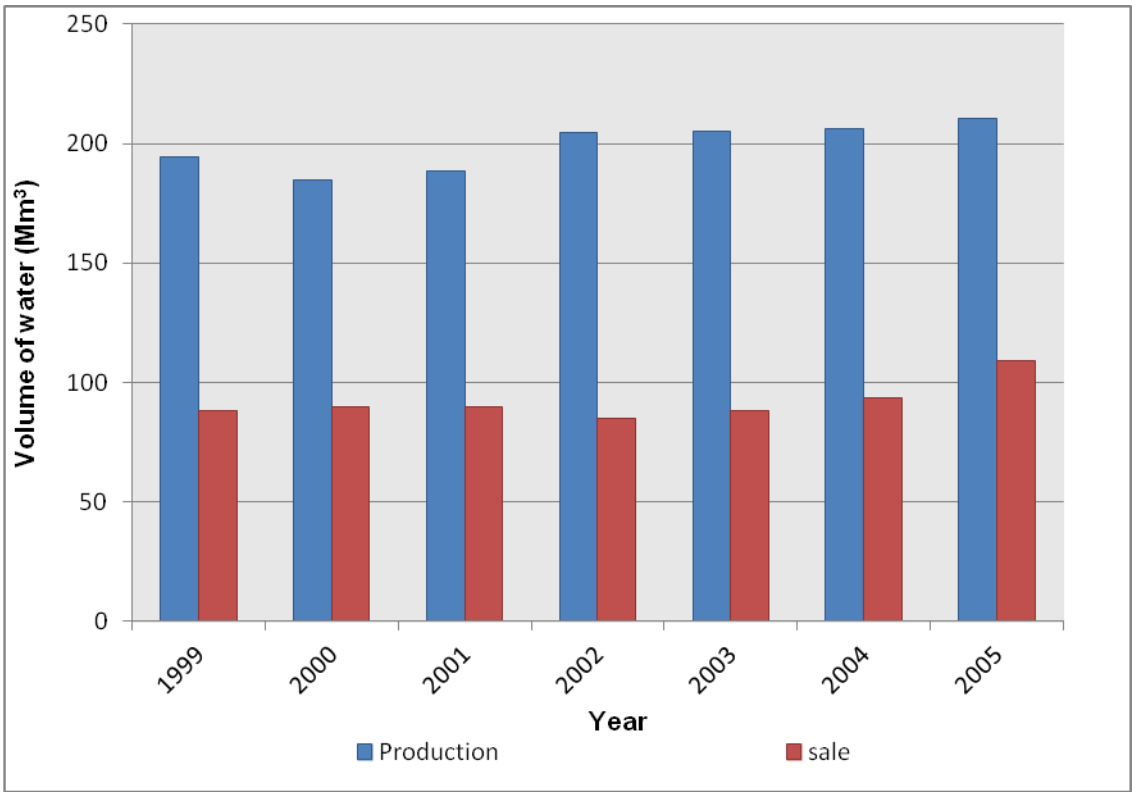


Figure 5-12 Water production (1999-2005) and sales (1999 – 2005), GWCL

Given that the claim made above by the company for the increase in water production in 1999 is true, then one may automatically expect an increase in water production after 1999 but the opposite occurred with a 5% reduction in water production in 2000 compared to the previous year. The reason being that, out of 120 smaller systems transferred to the District Assemblies during the year, GWCL

continued to operate 35 of the systems. Averagely, GWCL operated 98 systems in 2000 compared to 215 systems in 1999. In 2002, water production increased by 9% over the previous year due to the completion of the Adam Clark Plant at Weija (ATMA). Here again, it is significant to emphasise the point that after 2000 when new and higher capacity plants, were installed as in Weija and Tamale etc and transfer of smaller systems to the District Assemblies were completed in 2002, merely using the number of systems of GWCL to compare water production levels with those prior to 2002 could be highly problematic even if all other conditions remain same. For instance in 2001 and 2003, with only 82 systems and 83 systems in 2002, production levels were far above that of 215 systems in 1999 due to these reasons.

In 2003, breakdown of borehole systems at Jasikan, Anfoega and Worawora, loss in efficiency of raw water pumps at Vea, poor state of filters in Central Region resulting in reduction in raw water abstraction, frequent power outages across the nation greatly affected both production. Not only that but also, rationing programmes in ATMA, Volta, Upper East and Upper West Regions, deliberate reduction of water production in Brong Ahafo, and Upper West Regions due to low water demand during the rainy season, low yields of boreholes in Bawku during the dry season, occasional damaging of distribution pipelines in Accra west due to road construction works, inadequate distribution network in the western part of Accra compelled ATMA to produce at 153,000m^3per day as against a capacity of 189,000m^3 per day. All these factors resulted in the marginal improvement in water production in 2003. (GWCL, 2003)

Now, Accra Tema Metropolitan Area (ATMA) water supply system being the largest system significantly influences the overall water production levels. And therefore whenever ATMA system suffers a technical and operational hitch, the overall water production suffers significantly. Evidently, in both 1999 and 2000, ATMA recorded 73 percent of the total city water production and consecutively in 2001 and 2002,ATMA, Kumasi, Sekondi-Takoradi and Cape Coast contributed 82 percent of water production while other urban systems contributed the remaining 18 percent but with ATMA alone contributing 60% and 63% respectively. According to GWCL, (2000),the breakdown of an electrical transformer at Kpong Headworks, (part of ATMA system) frequent power outages, low voltages and rehabilitation

work at Weija (part of ATMA system) in 2000 accounts for the significant decline in water production in that year.

Throughout the 7 years (i.e. 1999 – 2005), water sales had lagged far behind water production to the extent that less than 50% of water produced could be sold due to high non-revenue water recorded during the period.

5.4.1 Efficiency and effectiveness, GWCL

Non-revenue water

One noticeable feature that is worth mentioning following the conversion of Ghana Water and Sewerage Corporation into a Limited liability company in 1999 is the consistent improvement in water production after 2000, though marginal. Conversely, from 1999 to 2005, GWCL recorded notorious levels of non-revenue water (NRW) ranging between 48.3% in 2005 and 58.4% in 2002. The implications are that, less than 50% of the water produced by GWCL from 1999 to 2004 could be accounted for except in 2005 when 51.7% of the water produced was accounted for.

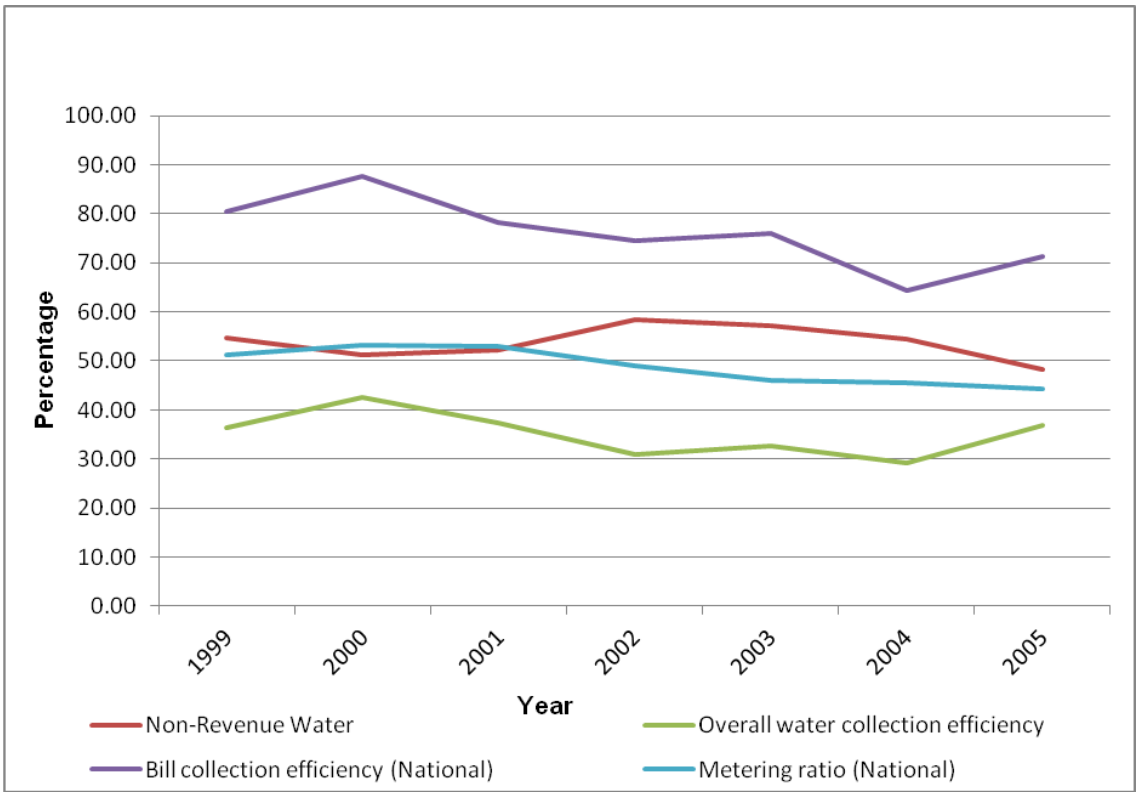


Figure 5-13 NRW, Metering & Bill Collection Efficiencies, GWCL

The study revealed that the high levels of water losses stemmed from leakages on transmission and distribution mains, bad service connections due to ageing networks, unauthorised consumption (i.e. illegal connections and by-passing of meters), metering inaccuracies (i.e. wrong reading of meters faulty meters, non-reading and wrong recording of bills), insufficient consumer and production meters, lack of effective monitoring, and corruption on the part of some officials of the company. This situation reveals a high level of operational inefficiencies, ineffectiveness and poor managerial practices within the public water utility.

Nevertheless, the author holds the view that one critical technical aspect of rehabilitation projects that both GWSC and GWCL failed to address was the replacement of all weak and ageing networks alongside the installation of new and more powerful pumps whose high pressures could only worsen the already precarious non-revenue water situation by causing more weak pipes to burst and therefore leading to more water losses. According to PURC (2005), operators in Santiago, Chile (a private operator), Germany (a mixed public-private operator), UK (a private operator) recorded overall collection efficiencies of 73%, 83%, 73% respectively in 2002, and Gdansk, Poland (public operator) 78%, in 2001 Senegal (a private operator) 80% and Central Region, Malawi(a public operator) 78%, in 2000.

Relatively, the performance of GWCL could best be described as abysmal and appalling as its overall collection efficiencies fluctuated between 29.3% in 2004 and 42.7% in 2000, during the same period. Finally, low and declining bill collection efficiencies of the utility resulted in a perennial build-up of revenue arrears which at a point was tackled through the commissioning of a prepaid metering project in 2000 in some selected communities in the Accra-Tema Metropolitan Area (ATMA). This resulted in improvement of revenue generation in Tema in the Accra-Tema Metropolitan Area in 2000 (GWCL, Annual Report, 2000). Overall, the utility's level of overall water collection efficiency very much exposes the poor performance of the public water utility during the period. Structurally, it is very difficult to reduce NRW. Kingdom, Liemberger, and Marin (2006) as cited in IBNET, (2014), posit that reducing NRW is not just a technical issue, but is also linked to weak management. When looking

at a set of managerial indicators, the link between NRW performance and managerial performance is less than clear.

Customer metering

Technically, it is impossible for a water utility to accurately determine its metering ratio without having a sufficient and a reliable data on its customers. The ability and capacity of most utilities to generate adequate and reliable data poses a major challenge to most water utilities for decades partly due to housing systems of which Ghana is no exception. Until a thorough nationwide survey is undertaken on customers to ascertain the validity of strength of its customers, the operator has no other option than to continue with the "old order" in which customers' strength and water consumptions could only be determined employing estimates and guesstimates during billing.

During the period under review, metering activity posed a major challenge to the water utility considering its direct correlation with level of water losses. The utility achieved its highest metering ratio of 53.1 percent in 2000 after the company had pursued a more aggressive programme in 1999 towards customers' metering by procuring 40,000 new meters in 1999 for installation. However, upon installing 70 percent of these meters in the year, the metering ratio could marginally improve from 46.9 percent in 1998 to 51.1percent in 1999 and woefully failed to attain its target of 85 percent, since most of the meters procured were used to replace defective meters instead of installing them for the existing unmetered customers (GWCL, 1999). After 15,000 meters were installed in the following year and procuring additional 20,000 meters, metering ratio could only marginally increase to 53 percent in the year 2000. Unfortunately, severe financial constraints in 2001 hindered GWCL from procuring more meters as planned and therefore could only procure 10,000 more meters that were later installed in 2002but saw a decline in its metering ratio as customer strength significantly increased without a corresponding increase in the number of installed meters until 2005

Billing and collection

Billing (water sales) and bill collection constitute two major activities of every water utility unless the utility is being run on charity otherwise, they are vital for the financial health and sustainability of water utilities. More often than not, poorly performing public

utilities suffer from low bill-collection ratios due to lax enforcement and the fact that most customers feel reluctant paying for poor services (Marin, 2009). The effects of cost reflective tariffs on a utility's financial health can only be realised if billing and collection are effectively and efficiently combined while at the same time addressing the challenges of water losses. The inefficiencies and ineffectiveness of water utilities in the area of billing and collection are sometimes deliberately buried, crowded and overshadowed by issues of cost reflective tariffs as it has been in the case of GWCL. Thus, any public water utility that lacks these attributes has very little chance of survival without subsidies from central government as long as both financial and operational inefficiencies persist.

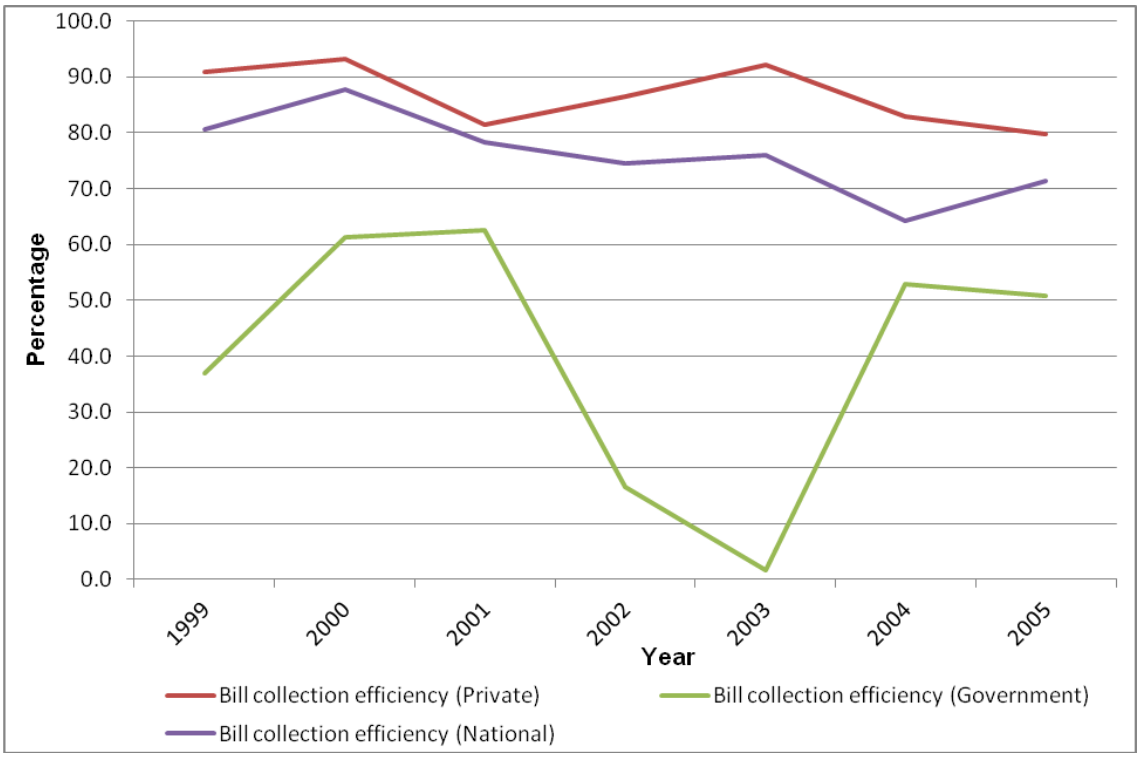


Figure 5-14 Bill collection efficiencies, GWCL

In terms of absolute figures, GWCL had successively recorded various levels of improvement in billing. It recorded 28.4% in 1999, 18.2% in 2000, 73% in 2001, 74.8% in 2002, and 33.1% 2003, 18.2% in 2004 and 13.7% in 2005 over their previous years. However, it is significant to emphasise here that these improvements in water sales were somewhat due to tariff increases and not necessarily due to efficient and effective billing. A specific case in point is that of 1999 where a 130% tariff increase was granted

to GWCL in 1998 and thereby automatically and inevitably resulting in an upward performance in billing in the first quarter of 1999 with an additional tariff increase of 30% in June, 1999. Other factors that contributed to the improvement in billing and collection over the years include the:

- improvement in arrears collection,
- installation of more consumer meters,
- institution of illegal connection detection task force,
- opening of more payment centres, - mobilisation of private sector support for meter reading and bill distribution, updating, and
- reclassification of different categories of customers (GWCL, 1999; 2000; 2001; 2002 and 2003).

Also, worthy of mention is the abysmal and consecutive decline in the collection ratios of MDAs from 96.3% in 1996 to 37% in 1999 caused by decentralisation of payment of water bills of all agencies of government. This however, dramatically improved in the year 2000 following discussions between the company and the Ministry of Finance and the utility's subsequent aggressive metering and review of averages and estimates for unmetered water customers. Overall, the result was an upturn in performance in Government's collection from 37% in 1999 to 61.3% in the year 2000. Partly, low collection points also contribute to the low collection efficiencies recorded by the water utility and this conspicuously reflects in the days receivable ratios below. In 2000 the perennial build-up of revenue arrears caused by low collection efficiency was strategically tackled by commissioning a prepaid metering project in some selected communities in the Accra-Tema Metropolitan Area (ATMA) in Tema resulting in a significant improvement in revenue generation in ATMA (GWCL, 2000).

Overall, lack of sufficient meters and accurate data on customers posed a major challenge to the utility's ability of billing and collection since majority of its customers were unmetered and therefore could only bill using guesstimates which introduces or raises a new debate or dimension in the area of commercial and technical corruption.

During a customer survey undertaken by the author in 2008 and 2010, a majority of unmetered customers showed their preferences towards non-metering stating that *"people with meters pay too much".* Again, this preference of unmetered customers

confirms the earlier assertion of the author that customers who enjoy “flat rates” are generally under-billed leading to significant losses of revenue to the water utility.

5.4.2 Financial ratio analysis, GWCL

Days receivables ratio

Despite all steps and strategies embarked upon by the management of GWCL in order to improve its collection efficiency, average bill collection period it could only make a marginal improvement from 221 days in 1998 to 208 in 1999 with further deterioration to almost 10 months in 2002. Partly, it is due to delays in the payments of bills of the MDAs. Days receivables ratio being a customer management indicator only reveal how ineffective and unenthusiastic the programmes pursued during this period were. However, average collection period steadily improved after 2002 (i.e. 108 days, approximately, 3.5 months). The high accounts receivables significantly further worsened the financial stress the utility suffered during the period. To a large extent, strategies employed by GWCL from 2003 onwards including the revision of illegal connection detection strategy with 100 percent increase in the incentive package to 200,000 cedis for tip offs upon certification and the shortening of new service connection time to two weeks after payment of connection fees and monitoring teams in the regions to enhance supervision at the district levels yielded some positive results (GWCL, 2003).

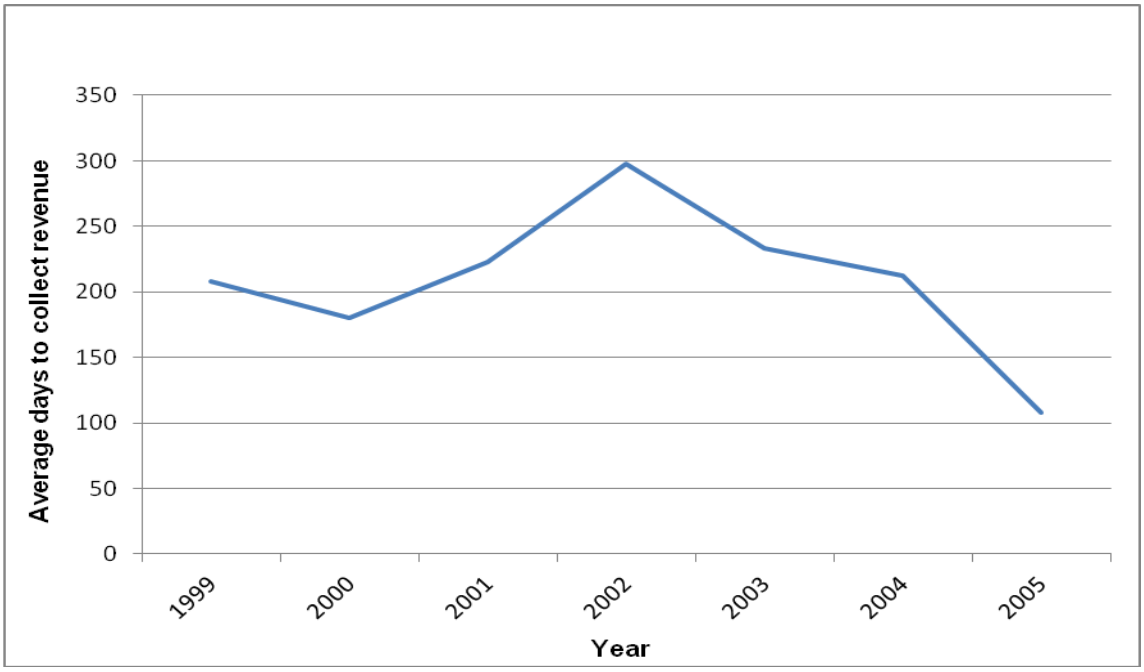


Figure 5-15 Days receivables ratio, GWCL

Ultimately, with large amounts of the utility's funds tied up in receivables for over 10 months (sometimes due to long billing periods of three months), its liquidity position was greatly affected during the period under review. The figure 5.16 depicts clearly the critical liquidity position of GWCL since its inception in 1999 except in 2005 when its current ratio improved to a more favourable and acceptable level of 2.02. Its short-term solvency however worsened from 0.49 in 1999 to 0.23 in 2000 mostly due to exchange losses during the year following a very high annual inflation rate of 40.54% compared to 13.79% in the previous year. In that year of 2000, one US Dollar was exchanging for GH₵ 3,560 at the outset of the year and further worsened to GH₵ 6,887 at the end of the year (GWCL, 2000 and IMF, 2011).

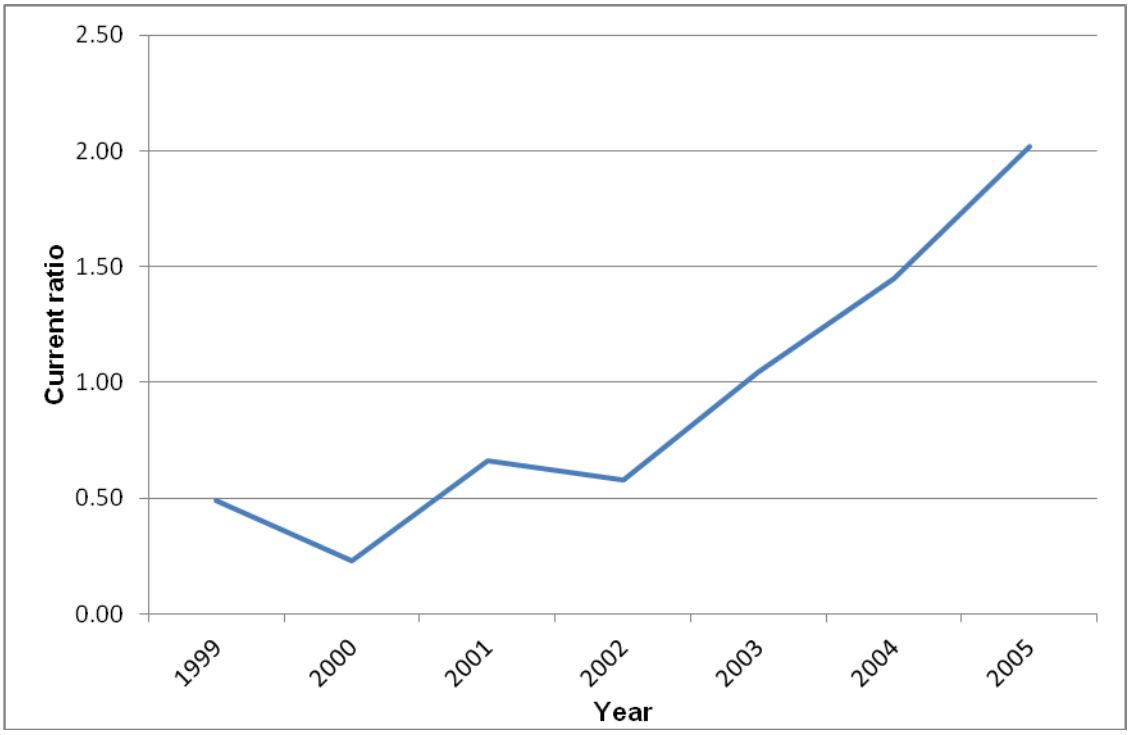


Figure 5-16 Liquidity ratio, GWCL

In 2001, the company's liquidity position improved temporarily but quickly declined in 2002 again due to some exogenous factors including late approval of 40% tariff increase which took effect in the eighth month, the drying up of some rivers (Tano & Moku) and poor river inflow into the Kakum dam in the Central Region also resulted in a complete shutdown of the plant at Brimsu in C/R for nearly two months. This compelled the company to provide tanker services to customers thereby incurring a cost of GH¢ 1.1billion (GWCL, 2002).

Profitability

Apparently, Ghana Water Company Limited failed to control its operating expenditure on personnel, chemical and electricity which have for decades eluded GWSC and posed major managerial and financial challenges to the public utility's profitability. As stated earlier, high inflation and exchange rates significantly affected costs of chemicals and electricity leading to high cost of production especially in 2000. Furthermore, the revaluation of the company's assets in 2000 greatly contributed to the quantum leap in the total cost in 2000 due to a depreciation cost of US$26.2 million compared to US$6.85 million in the previous year. Generally, GWCL recorded high operating ratios ranging from 99% in 1999 to 77% in 2004.

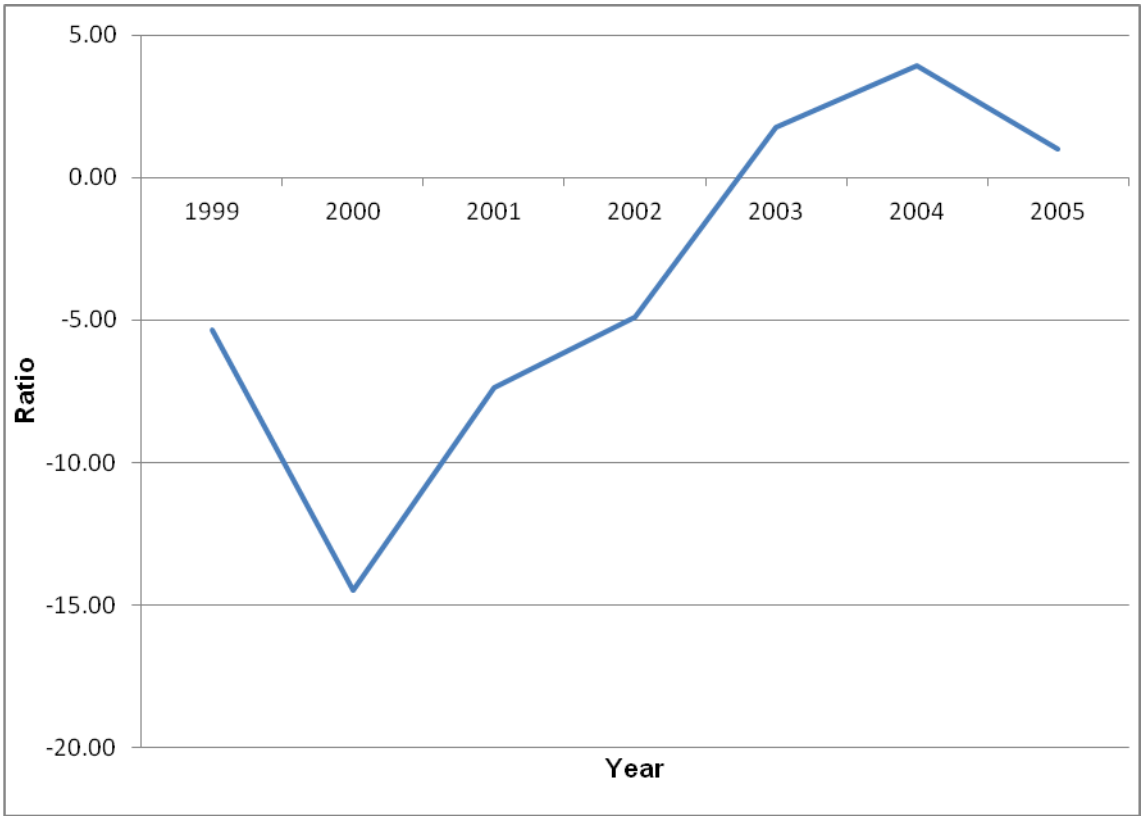


Figure 5-17 Profitability ratio, GWCL

Operating ratio

Averagely, the company's production and general administrative cost components of the operating cost constitute more than 75% of the operating expenditure with energy costs alone representing more than 50 percent of the production costs except in 1999. Imperatively, any attempt to improve the operating ratio would require efficient management and control of both the chemical and electricity costs in order to ensure that sufficient cash is available for non-operating expenditures. In 2001, the company's account showed an overall negative balance which almost led to the qualification of the company accounts casting it in a very bad light. In view of the above, two options were considered in order to redeem the company through:

i. securing a letter of comfort from Ministry of Finance and
ii. obtaining a debt relief under the Highly Indebted Poor Countries (HIPC) Initiative

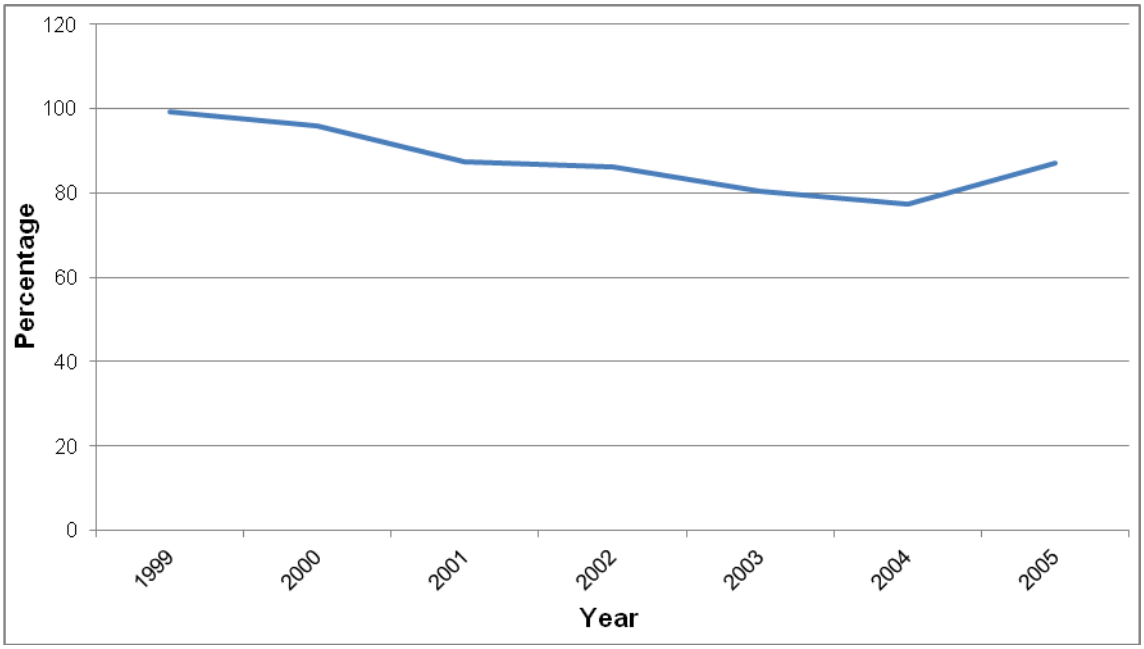


Figure 5-18 Operating ratio, GWCL

Following the poor financial performance of GWCL in 2001, and also by way of partially redeeming the company, the Ministry of Finance and Economic Planning had to approve a facility under the Highly Indebted Poor Country (HIPC) Initiative. Eventually, this action gave birth to the signing of the water company's audited accounts in 2001 and 2002.

To further lay emphasis on the gravity of the situation, the Ministry of Finance and Economic Planning's inability to issue a letter of comfort to enable the External Auditors sign the 2001 Accounts delayed the signing of the 2002 financial statement which showed a negative working capital. But with Government taking up all loans of the company in addition to the HIPC relief facility granted to the company in 2002, its financial position improved and finally enabled auditors to sign the company's accounts (GWCL, 2002).Albeit, it is difficult to state exactly factors that might have contributed to the worsening operating ratios of the company after 2003 as very little or no comprehensive technical/operational reports exist on the performance of the company in 2004 and 2005,the author dares to suggest that largely, operational inefficiencies accounted for this since the company's inception in 1999.

Average costs of water produced and sold

Here, the graph shows that the average cost of water produced and that of tariff were the same in 1999 and 2002 while the average cost of water sold was always higher than the average cost of water produced and that of tariff except in 2003 when it equalled the average tariff. Somewhat, if high non-revenue water had been managed to a low of 25% considering the difference between the average costs of water produced and the tariffs, the utility would have made profits during the period under review.

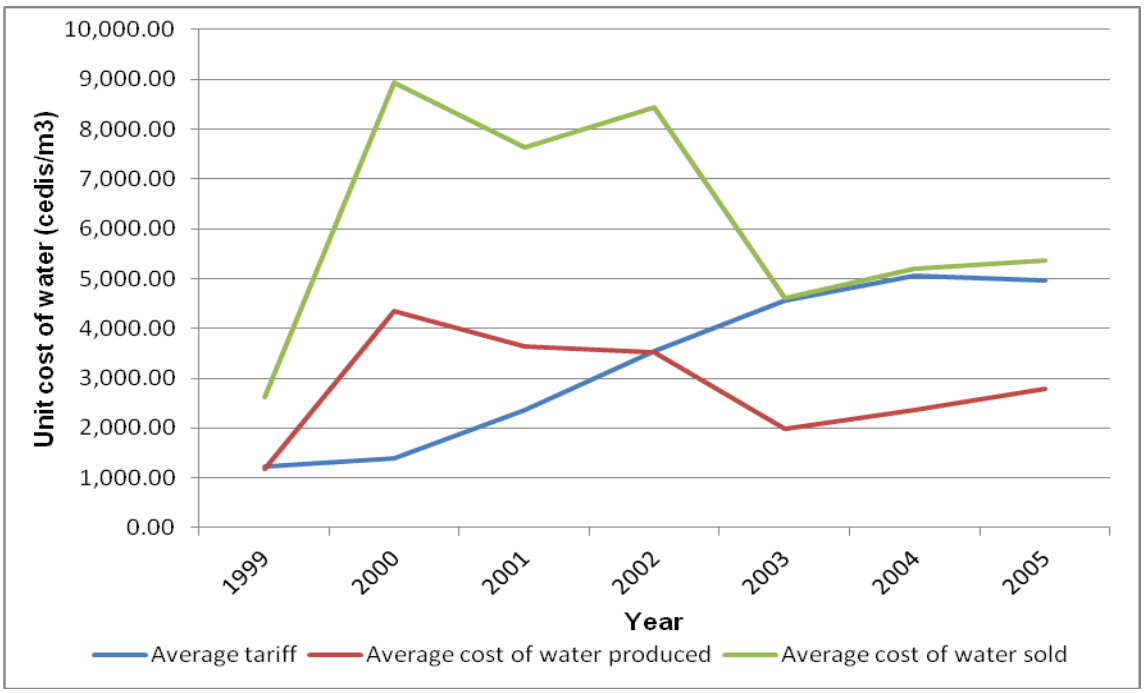


Figure 5-19 Average tariffs, cost of water produced and sold, GWCL

Creditworthiness

From 1999 to 2003, the company's debt to equity ratios exceeded 100% and would be interpreted that, majority of GWCL's assets were financed through debts during the period with 2001 being the company's worst leverage of 312.87%.Thevolatile economic environment in Ghana at the time coupled with the company's inefficiencies greatly exposed the company to very serious financial risks where high inflation rates were

culminating into high rising exchange rates and both ultimately and directly translated into high exchange and interest losses and therefore adding on to the company debts.

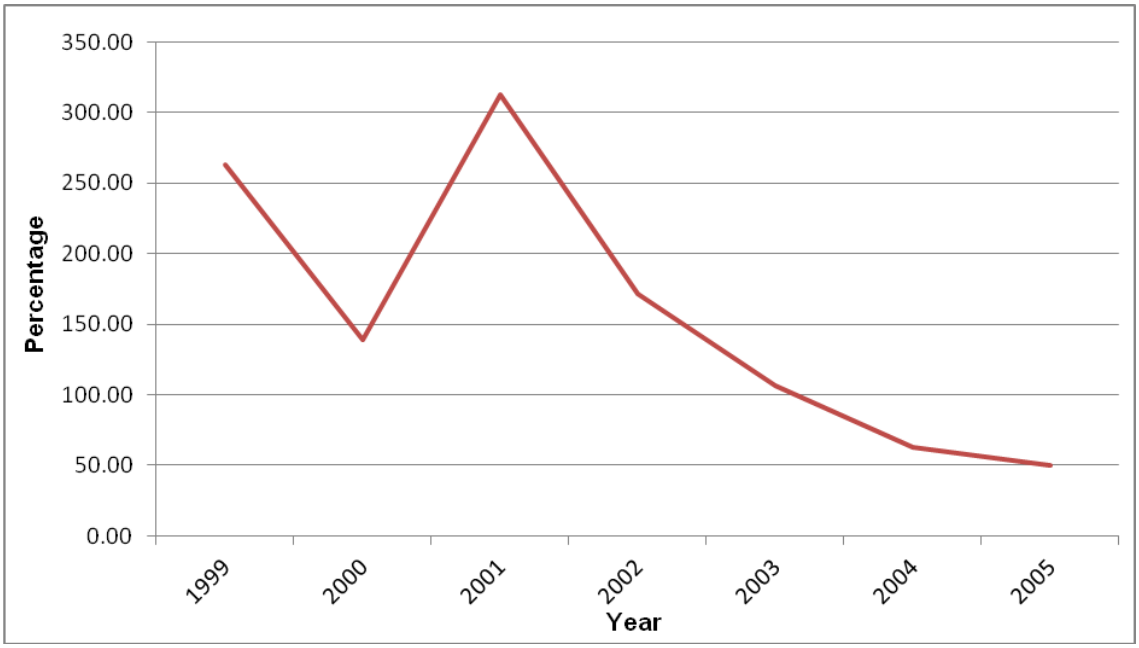


Figure 5-20 Creditworthiness ratio, GWCL

For instance, a sharp increase in exchange rate (i.e. local currency per USD) from GHC 2,669 in 1999 to GHC 5,455 in 2000 translated into an exchange loss of US$164.1 million compared to the exchange loss of US$34.7 million in the previous year. Thanks to government of Ghana for strategically and timeously employing a HIPC relief facility in 2002 to absorb all debts/loans of the company. This resulted in the sharp reduction of the company's debt to equity ratio from 172%in 2002 to 49.9% in 2005.

Project financing

Over the years, several development projects have been undertaken within the urban water supply sector by the public water utility including:

i. the rehabilitation of some existing water supply systems,
ii. construction of new water schemes,
iii. expansions to existing systems and
iv. provision of operational support equipment and improvement studies towards capacity expansion of existing water schemes.

Prior to government's engagement of the private operator in June, 2006, majority of the water utility's projects that were undertaken and completed were largely financed through external support agencies or were foreign assisted. Nonetheless, some of the above-mentioned projects faced some financial challenges and setbacks. In fact, 94.2% of funds utilised in 2002 for development projects came from external support agencies and between 1995 and 2003, external support agencies financed more than 50% of all development projects undertaken. Largely, this assertion reveals the high level of the public water utility's dependence on foreign support by way of long term loans and grants stemming from poor management practices culminating into perennial financial stress which the then Kufuor government used as a major reason or justification for engaging the private operator, AVRL in June, 2006 in the urban water supply sector.

For decades, various governments of Ghana have continued to finance the urban water utility and this has for several years continued to pose heavy financial burdens on government to the extent that it failed to honour its actual expenditure to GWCL for three consecutive years (i.e. 2000, 2001 and 2002).

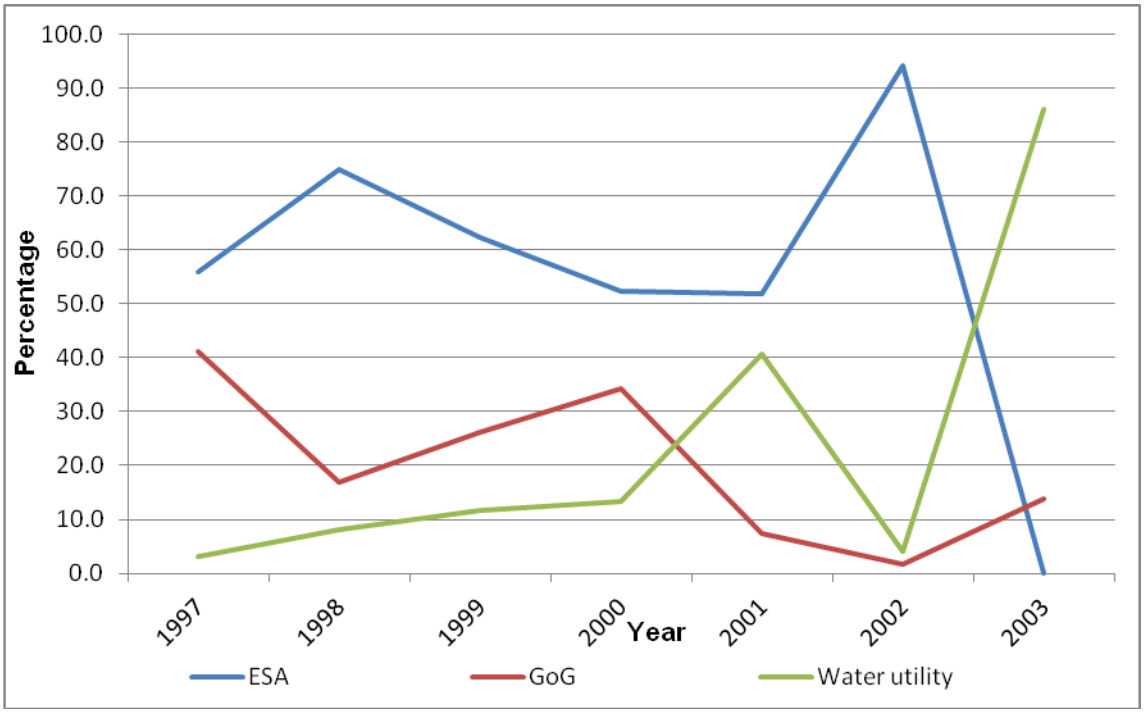


Figure 5-21 Project financing, GWCL

As shown in Table 5-21, the actual government expenditure for the urban water sector in 2000, 2001 and 2002 were 25.62, 3.44 and 1.09 billion cedis respectively constituting 71.6%, 52% and 37% of the budgetary allocations while government releases stood at GH¢16.6, 1.06 and 0.322 billion respectively. However, it must be explained that government's releases in 2000 stood at GH¢16.6 billion with an outstanding debt of GH¢9.02 billion for the year 2000 (GWCL, 2000). Surprisingly, in 2003 when the utility had no funding from external support agencies, GWCL managed to finance 86.1% of its own development projects with an amount of GH¢18.73 billion which exceeded twice the amount budgeted for the year. However, the repayment of Social Security Bank loans contracted for Messrs Horseley Bridge Tanks of the UK in 2003 partly accounted for the high figure of GH¢18.72 billion that was recorded (GWCL, 2003).

Table 5-1 GWSC/GWCL funding of development projects (1997 – 2003)

		YEAR						
		1997	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
Budgeted amount (GHC Billion)	ESA	173.5	157.0	96.5	35.6	50.6	68.0	87.73
	Govt.	22.6	20.6	17.2	23.19	6.64	2.947	2.379
	GWCL	17.8	14.3	16	19.9	19.8	3.4	8.0
TOTAL		**213.9**	**191.9**	**129.7**	**78.69**	**77.04**	**74.347**	**98.109**
Actual amount (GHC Billion)	ESA	44.8	80.6	43.14	39.29	23.96	60.208	-
	Govt.	33.0	18.1	18.05	25.62	3.44	1.09	3.01
	GWCL	2.4	8.8	8.02	10.04	18.72	2.622	18.70
TOTAL		**80.2**	**107.5**	**69.21**	**74.95**	**74.95**	**63.92**	**21.71**

Source: GWSC/GWCL, 1997; 1999; 2000; 2001; 2002 and 2003 annual reports

Funds released by government in 2003 for the Bawjiase water project were mainly HIPC funds (GWCL, 2003).

Generally, investment in water infrastructure is highly capital intensive and remains a major challenge to most governments and public water utilities in the developing world. Capital investment constitutes a critical component of every water utility's commitment towards ensuring that water supply services are effectively, efficiently, sustainably and adequately provided to the ever increasing water consumers and customers for steady economic growth and improvements in human development. As is usual for most water utilities in developing countries such as Ghana Water Company Limited, financing of urban water supply projects is predominantly done through external/foreign loans and grants, government sources and sometimes employing revenues generated through the sale of water.

The study revealed that investments undertaken by the public urban water utility fell below the needed levels and therefore failed to match up with the ever-increasing levels of urban water demands in cities of Ghana prior to its conversion to a limited liability company (GWCL) in 1999. The inability of the public water utility to run efficiently and effectively at the time gave birth to insufficient revenue generation. Investments therefore suffered greatly during the period leading to a significant decline in investment levels after 1996 and gradually picked up after 2002. By estimation, GWCL required at least US$100 million in 2004 if it was to achieve its target of supplying water to all of its customers. Meanwhile, GWCL's annual investments during the period fell far below the required level. For several years, the company had struggled to ensure sufficient investments in machinery and technology by way of retooling so as to steadily and progressively increase its water production as a result of huge perennial shortfalls in revenue.

Funding of the utility's development projects were supported by external Agencies, Government of Ghana and Ghana Water Company Limited itself. But then, repeatedly, the officials of the public water utility have complained and explained that governments have not allowed the water utility to charge realistic tariffs that will ensure adequate generation of revenue and hence its inability to replace aging pipes, purchase new equipment and undertake major system expansion activities. Even though one may describe the urban water supply situation in Ghana as more of a crisis than a normal challenge which most public water utilities face, some credit and recognition need to be

given to the efforts of the utility's engineers and technicians for doing their best to keep the urban water supply systems running up till now, an official stated..

5.4.3 Customer perceptions of service

From 1991 to 2006, customer strength of the water utility had overwhelmingly grown from 167,512 to 378,300 (approximately by 126%) resulting from high demands and a customer mapping programme that was undertaken during the period. Generally, domestic customers of the water utility constitute majority of customers and therefore were used for the survey. Here, based upon the household survey conducted in Tamale (i.e. Kukuo, Vittin, Jisonayili, Gurugu, Gunbihini and Moshi Zongo), Kumasi (i.e. Asewase & Moshie Zongo, Amakom, Bremang, Asafo and Tafo) and Accra (i.e. Adeta Trotro station, Commando, SNNIT Flats & Housing, East Legon, Nungua Zongo, GREDA Estate, Teshie and Anyah) in 2010, where customers were asked to reflect on the services of the public water utility (GWSC/GWCL) before AVRL took over in June, 2006 similar assertions were made including; *"The attitude of GWCL workers has changed since AVRL took over, and now they know the difference between a customer and consumer"* which means that consumers were formerly perceived as mere 'users' instead of customers of the services the water utility. Naturally, positive customer relations won't just happen unless attitudes and skills of staff are polished through effective training, institutional and self discipline.

According to the respondents, customer call-centres that help customers to readily discuss or register their complaints including; irregular flow of water, no-flow, wrongful billing, pipe-bursts and leakages, stolen and faulty meters, wrongful categorisation of customers, late or no bill delivery, wrongful disconnection, non-reflection of payment and poor water quality for prompt actions to be taken were non-existent. Consequently, customer response time was usually delayed unnecessarily. In Tamale for instance, respondents indicated that customer service was poor in respect of water rationing, customer response time, billing and customer relations.

5.5 Performance evaluation of Aqua Vitens Rand Limited Management Contract **(AVRL, 2006-2011)**

After several failed attempts by Governments of Ghana to inject some level of financial and operational efficiency and effectiveness into its urban water supply sector, the Government was advised that one solution could be to introduce a private operator into the sector to operate and manage the poor performing public water utility. Government however was faced with the challenge of choosing a management model that needed to be politically convenient and wise in order not to suffer any unnecessary agitation and political pressure from civil society groups, organized labour and opposition political parties, particularly recognising the 2008 presidential and parliamentary elections.

Finally, a management contract was entered into in 2006 between the Ghana Water Company Limited, a limited liability company, wholly owned by the Republic of Ghana (*the Grantor*) and Vitens Rand Water Services BV, established under the laws of The Netherlands(*the Successful Bidder*) and Aqua VitRa Limited, a limited liability company established under the laws of the Republic of Ghana (*the Operator*)with the intention to:

- ensure and expand reliable supply of safe water in the urban areas
- ensure that low income consumers have access to potable water at affordable prices
- ensure sustainability of the sector through cost recovery
- ensure an adequate and steady flow of investment funds, with an emphasis on low cost and concession financing; and
- support the introduction of the private sector into management and operation of the sector under a management contract with the private operator.

An initial loan facility of $123 million was contracted and subsequently increased to 173 million by the World Bank and other donor agencies to undertake:

- Public-private partnership
- System expansion and rehabilitation
- Capacity building
- Project management and
- Severance programme

The private operator assumed operations in June 2006, and by December, it submitted its initial review report listing several snag items that were identified during the six-month period. A snag item was defined as:

> *" a defect or condition of the facilities identified by the operator before the commencement date or during the initial review that in the view of the operator, as confirmed by the Technical Auditor, prevents the system from meeting the service standards*" (AVRL, 2007)

Subsequent to this, a memorandum of understanding was signed on the 5th July, 2007 between the grantor (GWCL) and the operator (AVRL) and facilitated by the Technical Auditor (Fichtner). All parties agreed that the operator resubmits a comprehensive list of snag items (MoU, 2006).

According to the management contract, as part of the private operator's principal obligations, AVRL;

- shall have the right and obligation to provide the services in the service area on an exclusive basis during the management contract period. Should the grantor desire to expand the service area, the grantor and the operator shall meet and negotiate in good faith with a view to agreeing on the provision of services by the operator to such expanded service area and the payment to the operator thereof.
- the operator is entitled to:

- conclude contracts with customers for the supply of potable water in the name and on behalf of the grantor;
- issue bills on delivery of potable water and discharge of sewage;
- receive payments from the customers; and
- disconnect customers, except priority customers, for nonpayment and/or for other grounds in accordance with applicable law.

- the operator shall perform the services in accordance with applicable law (including environmental legislation and PURC regulations), prudent industry practice, the consumer charter, the service standards, the low income household policies and the PURC regulatory social policy. The operator shall

have care and custody of facilities during the term of this management contract and

- subject to this (section 3.1.3 of the management contract), the operator shall have discretion in determining the means and methods to be used to perform the services.

Meanwhile, taking into account the number of snag items identified in the initial review report, it became evident that the baseline used in the contract had not been correctly determined and even in areas where no snag items were reported, suggestions made to the grantor could hardly be effected after six months.

Apparently, the private operator (AVRL) faced some serious challenges right at the outset of its operations. First, the expatiate mangers required deep appreciation and understanding of the local and institutional politics that engulfed the urban water sector reform before the takeover if they truly wanted to make any meaningful impact by way of meeting the performance targets and other obligations. Also, the challenge of thousands of unregistered and illegal connections had to be confronted head-on by introducing new billing systems, grapple with long bureaucratic procurement processes, reducing the high non-revenue water of 53% in 2006 by at least 5% yearly and improve the company's days receivable ratio from 159 days in 2006 to that which did not exceed 90 days of non-public sector sales within twelve months.

All these performance targets required a strong but a committed management team that could ensure that all unproductive institutional cultures developed over the years are addressed on the part of both the staff and customers through regular training and education respectively. However, the initial review report revealed that the staff of GWCL that were seconded to AVRL had received very little training for many years and therefore lacked sufficient skills, knowledge and attitude to effectively and efficiently perform.

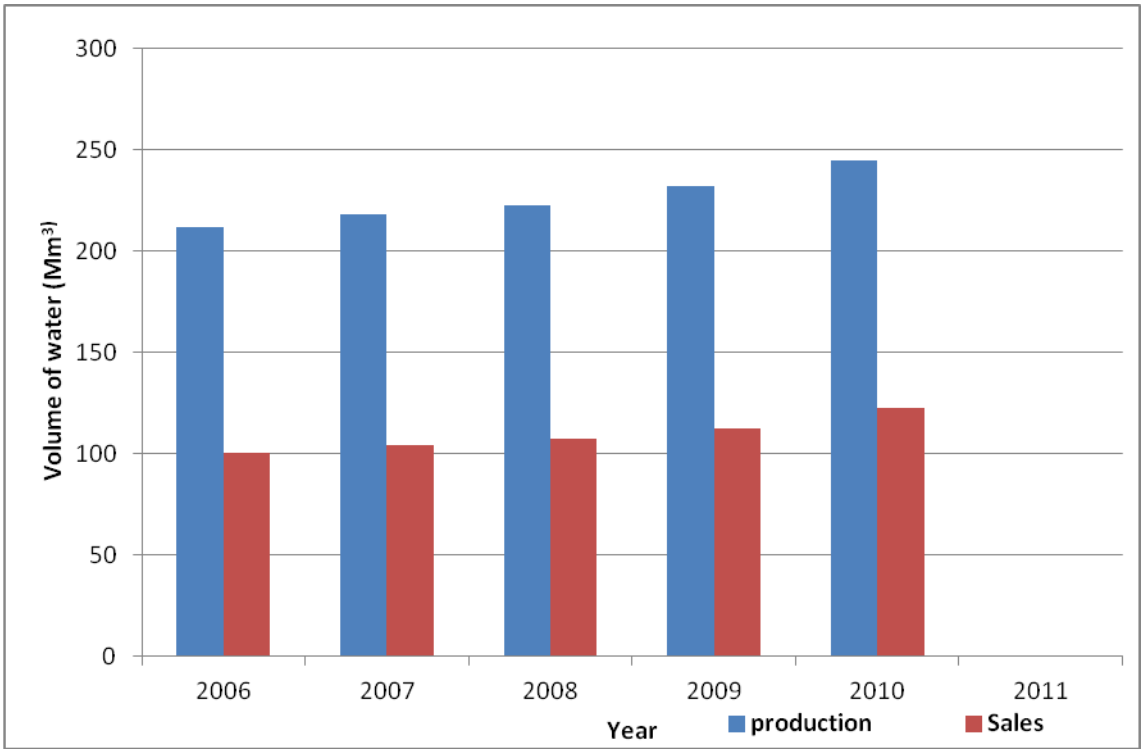


Figure 5-22 Water production and sales, AVRL

Progressively, but marginally, both production and sales improved from 2006 to 2011. An eight-month (i.e. from January to August) power rationing in 2007according to the operator accounts for the marginal increase of 1% in production during the year. It is however significant to indicate that although some of the figures were estimates as there were no working meters at some of the production sites, any inherent error(s) that might be associated with the estimates are the same for both 2006 and 2007 figures and therefore provides common grounds for comparison (AVRL, 2007 annual report).

In 2008, the utility recorded an increase of about 1% in production over that of 2007 but recorded a shortfall of 2.4% over the target set for that year. Water production became more stable as a result of the effective use of its RRR funds for repair, replacement, and rehabilitation of essential equipment including pumping and chemical dosing equipment, filters, and spares, and water quality monitoring equipment. Perhaps because of that rehabilitation process, a third of the production systems produced less than what was produced during the previous year. However, two thirds of the production system produced more mainly due to improved borehole operations which improved supply from the smaller systems to the respective communities (AVRL, 2008 annual report).

For 2009, the completion and commissioning of the Accra West-East interconnection, Tamale and Cape Coast (Sekyere Hemang) water expansion projects towards the end of 2008 helped increase the water production. Similarly the commissioning of a new system in Koforidua and that of Aburi water affected the production greatly in the subsequent years.

5.5.1 Efficiency and effectiveness, AVRL

Non-revenue water

By schedule 4 of the management contract, the operator was required to submit to the grantor for discussion and approval a plan for a systematic measurement and reduction of non-revenue water in its service area within twelve months from the day it commenced operations. Additionally, the operator was to specify how non-revenue water would be calculated in the absence of complete metering and determine yearly targets for reduction in non-revenue water in the service area by at least 5%per year per service area. In view of this, a number of steps were taken to reduce both the commercial and physical losses. For instance, a customer survey (mapping) was embarked upon in 2008 to generate a new geo- referenced customer database. According to the operator AVRL, (2008 annual report), the mapping significantly exposed different sources through which the utility was losing and continue to lose revenues both physically and commercially through leakages, pipe bursts, water theft, illegal connections, estimated consumption, inaccurate meter readings, etc. For instance, customers who were receiving water yet were considered as disconnected/suspended customers, customers that were receiving water regularly but were not being billed, customers that were commercial customers and yet billed using domestic rates, customers with faulty meters, wrong meter readings on the part of meter readers including leakages that were unattended to within the planned repair period.

Most intriguing is the revelation during the first survey exercise undertaken in 2008 which revealed that about 23,382 customers could not be traced in the Accra Tema Metropolitan Area (ATMA) (AVRL, 2008 annual report).In 2008 and 2009 for instance, Loss and Leakage Control Teams were adequately empowered and deployed in all 10 regions to deal with cases of water theft and any other abuses that might occur in the field. Strategically, ATMA supply area being the biggest contributor to the non-revenue

water, steps were taken to reduce the physical losses in 2009 by setting up 10 pilot teams in 10 districts in the ATMA supply area. This team was adequately equipped with motor bikes, GPS devices, repair tools and materials to deal with all leakage and repair issues. In line with what was started in 2008, zonal metering was further explored the following year leading to the creation of District Metered Areas (DMAs) that were controlled discreet hydraulic areas and provided with meters to improve water auditing and reduce non-revenue water. According to the operator, the DMA employed as a tool was more reliable and effective for managing non-revenue water.

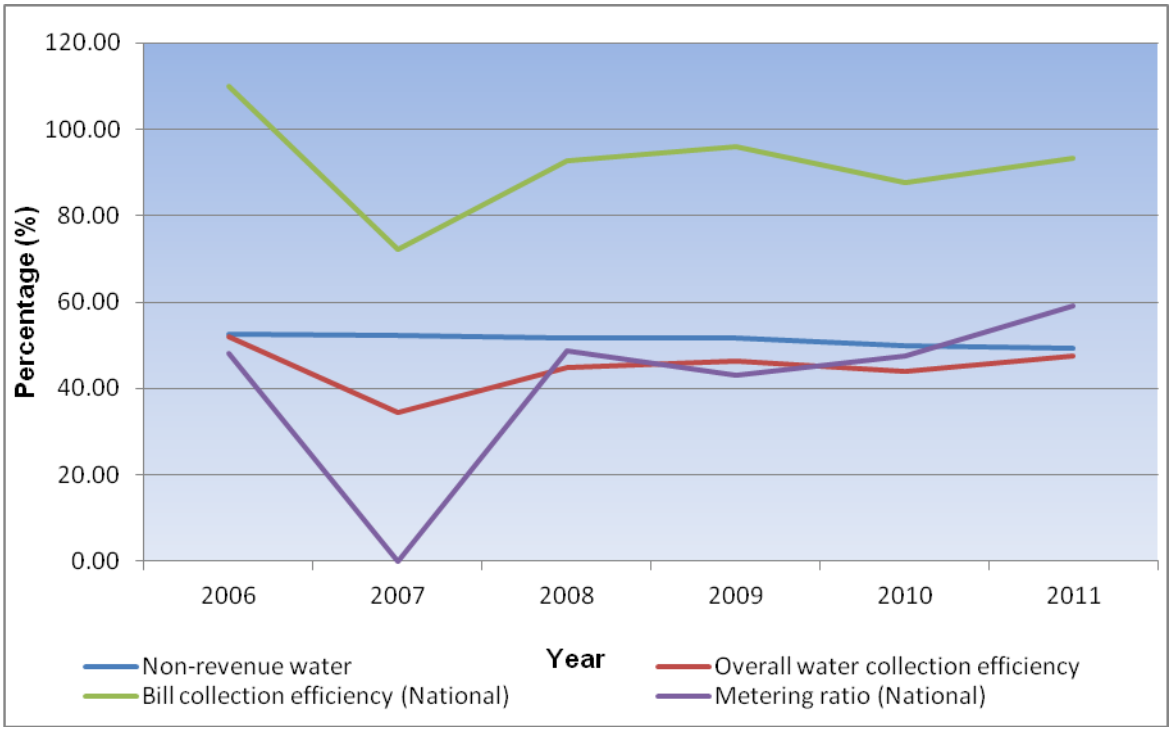


Figure 5-23 NRW, Metering & Bill Collection Efficiencies, AVRL

Nevertheless, no significant gains could be recorded during the period. For instance in 2008 and 2009, AVRL achieved a non-revenue water of 51.7% as against a target of 43.4% and a baseline of 51.5%, and 51.6% as against a target of 46.4% and a baseline of 51.5% respectively. Most significantly, throughout the five years, the private operator failed to reduce the 48.3% non-revenue water that it was contracted to address in 2005. It exited in 2011 with non-revenue water of 49.2%. From the graph, it is evident that operational effectiveness and efficiency of the operator has not achieved the desired targets.

On average, the utility's overall collection efficiency during the period under study was about 47.4%.

Metering

According to Fichtner, (2009), a status report submitted by the operator on metering to the Technical Auditor in July, 2009 proposing a revised metering plan showed that, out of a total number of 227 metering areas listed, only 112 had working meters as of May, 2009. Largely, both physical and commercial losses incurred during the period under review were determined using guesstimates due to unavailability of meters. However, with the help of the operator in 2008, the Grantor initiated an action towards the procurement and installation of bulk meters on all systems. In the same year, meter workshops in Accra and Kumasi were renovated and adequately equipped and some technical staff were also trained towards the refurbishment and calibration of flow meters. In the following year, the meter workshops received 3,994 faulty meters from the regions and1,294 were repaired and the remaining unserviceable meters were discarded. Additional14,694 SPX used-meters were imported in 2009 from the Netherlandsand5,565 were refurbished for the replacement of faulty meters in the regions. In Dansoman and Bortianor districts for instance, 1,000 and 3,239 domestic meters were installed respectively. The62highest water consuming metering areas were also metered to reduce commercial losses. Zonal metering was embarked upon in 2008 and intensified because of the positive results it produced. The metering ratio declined from 48.7% in 2008 to 43% in 2009 as a result of new connections made during the period without a corresponding increase in meter installation. However, as a result of a massive meter installation programme subsequently undertaken the ratio significantly increased to 59.2% in 2011. In general, metering improved during the five-year period and out of a total of 140 complaints that were filed against the AVRL through the Consumer Services Directorate of the PURC, metering constituted about 9% in 2009.

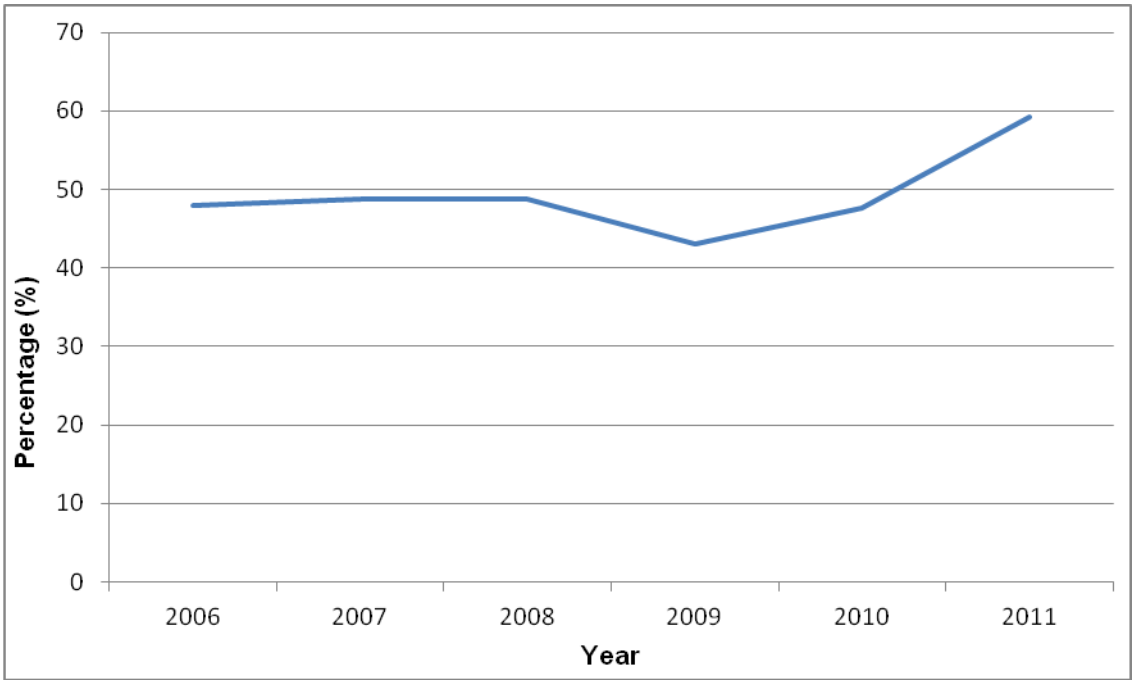


Figure 5-24 Metering ratio, AVRL

In 2009, the grantor demanded of the operator to provide it with the formula it employed in arriving at a domestic consumption of 50.4 litres per day per person in its report in December, 2009. Surprisingly, in response, the operator defined the customer consumption as the amount of potable water produced divided by the customer strength. This formula employed by the operator in determining the customer consumption could best be described as highly deceptive since the metering ratio was 43% and non-revenue water was above 50% at the time. Some might wonder if this could be a deliberate attempt to cover up for its operational inefficiencies and ineffectiveness. Metering remained stagnant in the early years of AVRL but improved in the last year of its operations.

Billing, and bill collection efficiencies

The viability of a water utility is ensured through effective and effective billing and collection. Also, improvement in revenue levels automatically promotes service extension and improvement in service levels. Nonetheless, bill collection became a major challenge facing the public utility prior to the engagement of the private operator in the urban water sector of Ghana. Somewhat, bill payment behaviour of customers is usually informed by customers' perception about services being rendered and how

strategic and aggressive the service provider is towards its bills collection. For instance, short billing cycles ensure bill collection positively.

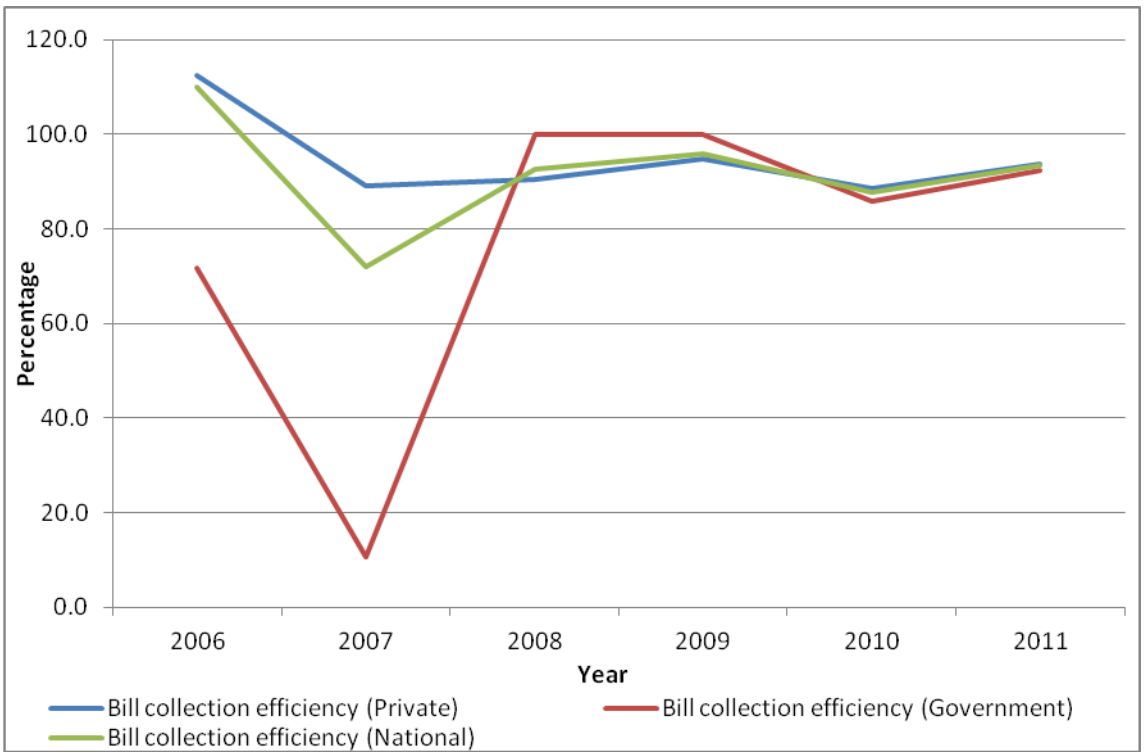


Figure 5-25 Bill collection efficiency, AVRL

Private operators are known for higher bill collection efficiency and from the graph, bill collection efficiency of private customers during the period under review was more than 88% except in 2007 while that of Government fluctuated between 10.5and 100 percent.

Generally, payment of bills of MDAs became the responsibility of Government but fraught with the challenge of long delays in payment of bills for several months which sometimes run into a year. Clearly the situation improved during the period of the private operator. For instance, only 10.5% of the bills could be collected from Government in 2007.The rest of the bill was however paid in the following year leading to over 100 percent collection efficiency that was recorded in 2008.Overall, bill collection efficiency improved perhaps due to various strategies employed by the operator.

5.5.2 Financial ratio analysis, AVRL

Days receivables ratios

Average bill collection period saw no improvement during the 5-year period. The shortest period registered during the period was 159 days in 2006 and the longest being 281 days in 2010 which improved to 213 days in 2011. It is however important to indicate here that the long delays associated with the payment of bills of MDAs partly accounted for the long bill collection periods during the period. In addition, the customer survey revealed that some customers failed to pay their bills voluntarily until they were compelled through disconnections. Furthermore, long billing cycles and poor quality of service in some regions also contributed to the long bill collection periods recorded.

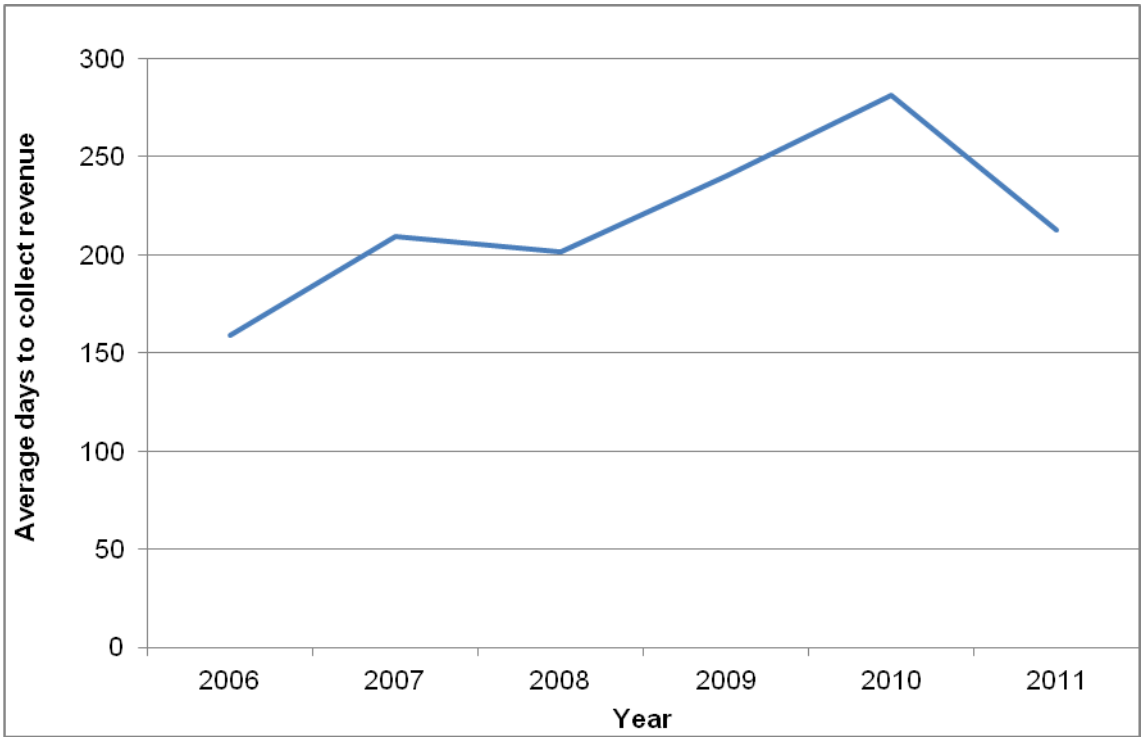


Figure 5-26 Days receivables ratio, AVRL

Liquidity

The relationship between the water utility's liquid resources available and the current liabilities is described employing current ratio expressed as the ratio of the current

asset to the current liabilities of the water utility. With the high receivables, it is evident that funds were tied up in cash hence the short-term solvency of the water utility became very low throughout the five-year period with the worst ratio of 0.75 recorded in 2011.Also, since 2007 till the year of exit of the private operator, the liquidity position of the utility never improved.

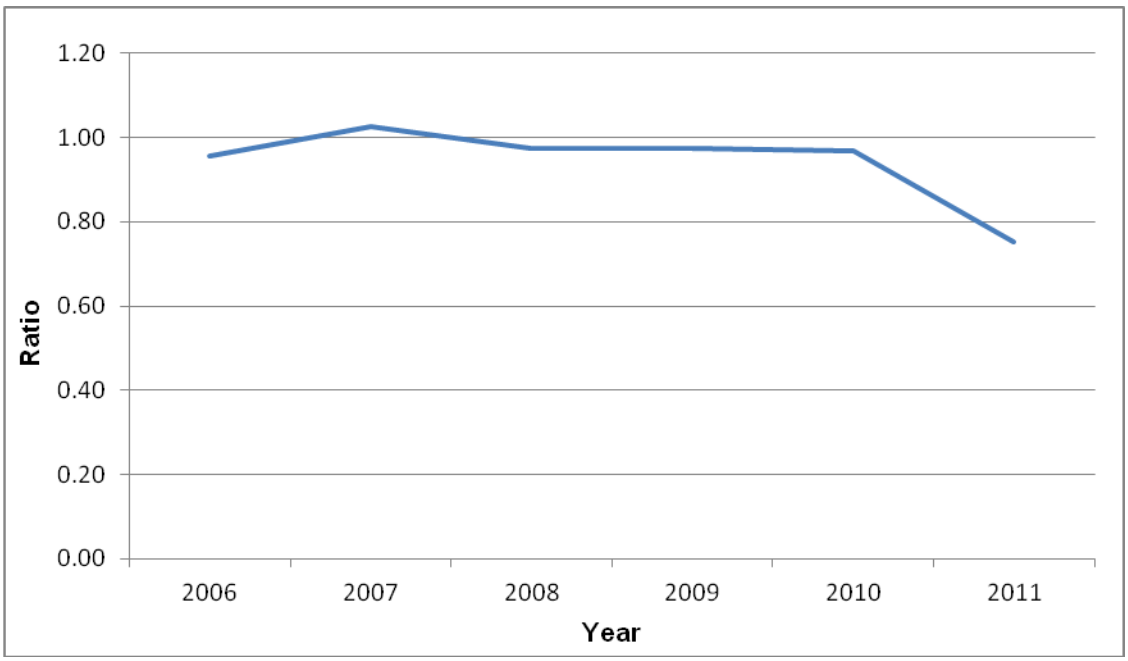


Figure 5-27 Liquidity ratio, AVRL

Operating ratio

During the 5-year period, the water utility's ratios of operating expenditure to operating income were very high ranging between 83 and 98 percent. The implication is that, very little income or virtually nothing was left to cater for its non-operating expenditures during the period. Further investigations revealed that electricity costs alone constituted about 50% or more of the production costs of the water utility while the production and general administrative costs components constituted more than 70 percent of the operating expenditure during the period under review.

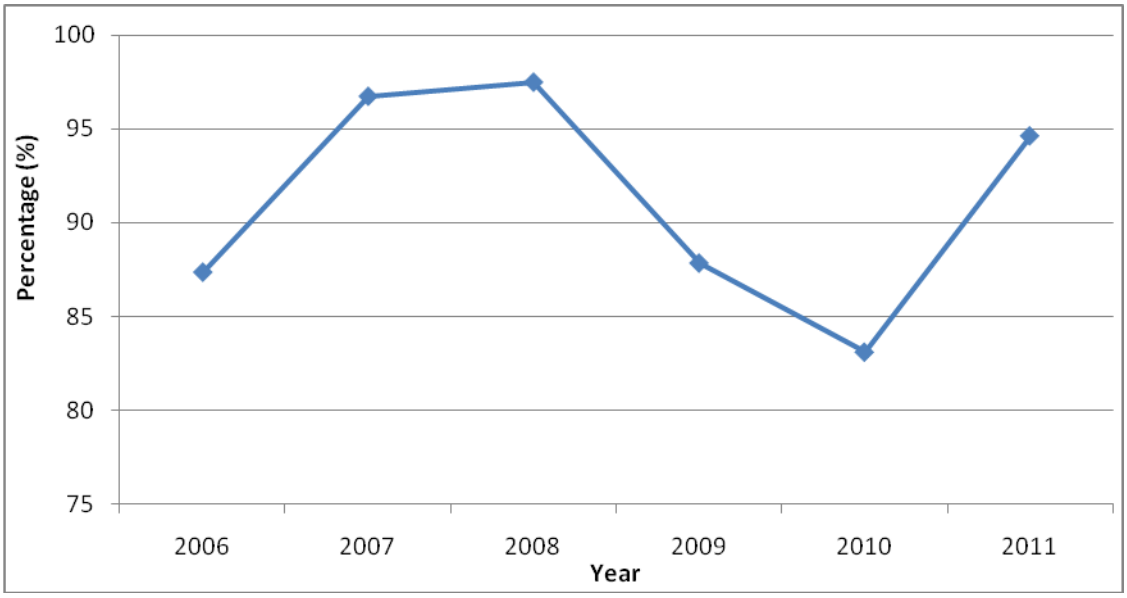


Figure 5-28 Operating ratio, AVRL

Through a Repair, Replacement and Rehabilitation Fund, some of the faulty and collapsed dosing equipment were replaced. In addition, a *'chemical loss control'* plan was employed to enhance the procurement, storage, transport and handling processes. Nevertheless, in spite of these attempts in 2008 and 2009 to reduce chemical costs, reduction in chemical usage was marginal. According to a Chemist at the Grantor, dosing could be done more efficiently if it was automatically applied instead of applying it manually.

Not only that but also, an energy team was formed in 2008 to perform scans on the biggest power consuming plants of the utility in order to strategise and address the perennial challenge of high electric power consumption. As a result of the team's findings, the Electricity Company of Ghana in 2009 credited the account of the water utility with an amount of GHC 4,741,006.43 following series of discussions held between management of the water utility and the Electricity Company of Ghana (AVRL, 2009 report).In addition, various motors, pumps and panels were replaced to ensure service reliability and also cut down on high electric power consumption and ultimately reduce the overall production cost of the utility. For instance, the operating expenditure dropped from US$ 92,442,250 in 2008 to US$73,307,520 in 2009 (i.e. 20.7%) when electricity cost recorded a dramatic drop in 2008 from 29,732,770 to US$12,970,580 in 2009 (i.e. 56%). All these efforts resulted in the lowering of operating ratios registered in 2009 and 2010.

Profitability

AVRL recorded deficits with regards to its return on fixed assets (ROFA) in 2007 and 2008 and also failed to operate within the desirable range of 6 to 8 percent throughout.

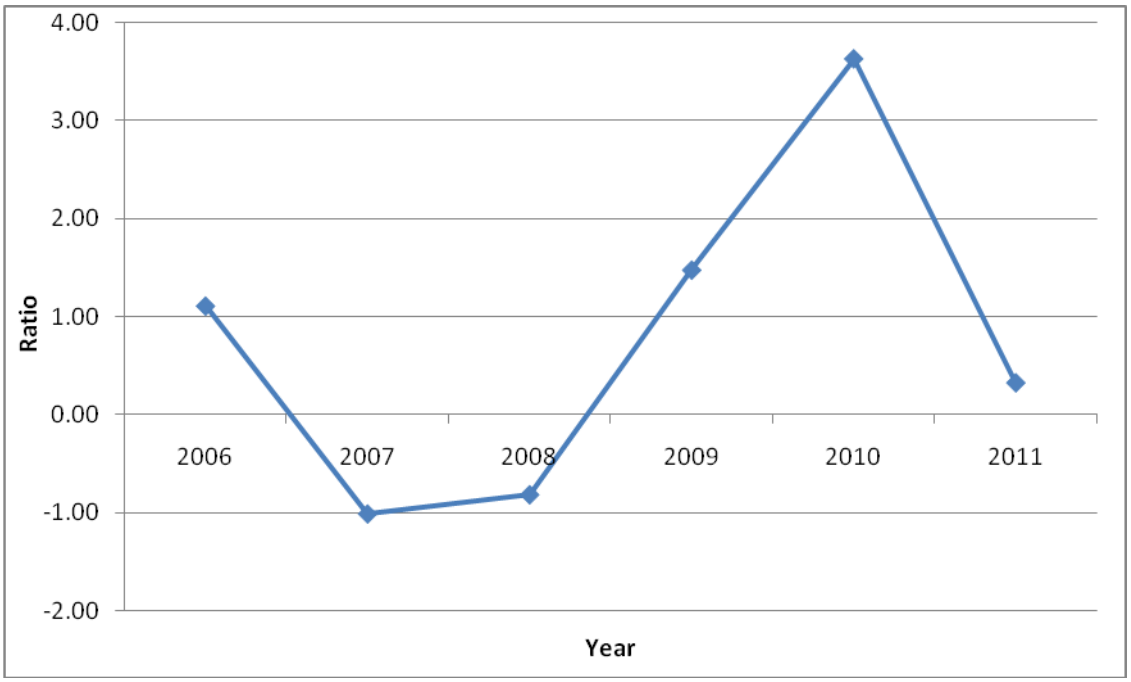


Figure 5-29 Profitability ratio, AVRL

The graph below shows a wide gap existing between the average tariff levels and unit costs of water produced from 2006 and may somewhat explain why the regulator sometimes refuses to increase tariff considering the difference between the average tariff and the average cost of water sold. It is therefore the candid opinion of the researcher that if the utility works on its high non-revenue water levels of more than 50%, the utility could break even. And therefore increasing tariffs will only help managers of the water utility to select the lazy options while making customers to continue paying for their inefficiencies.

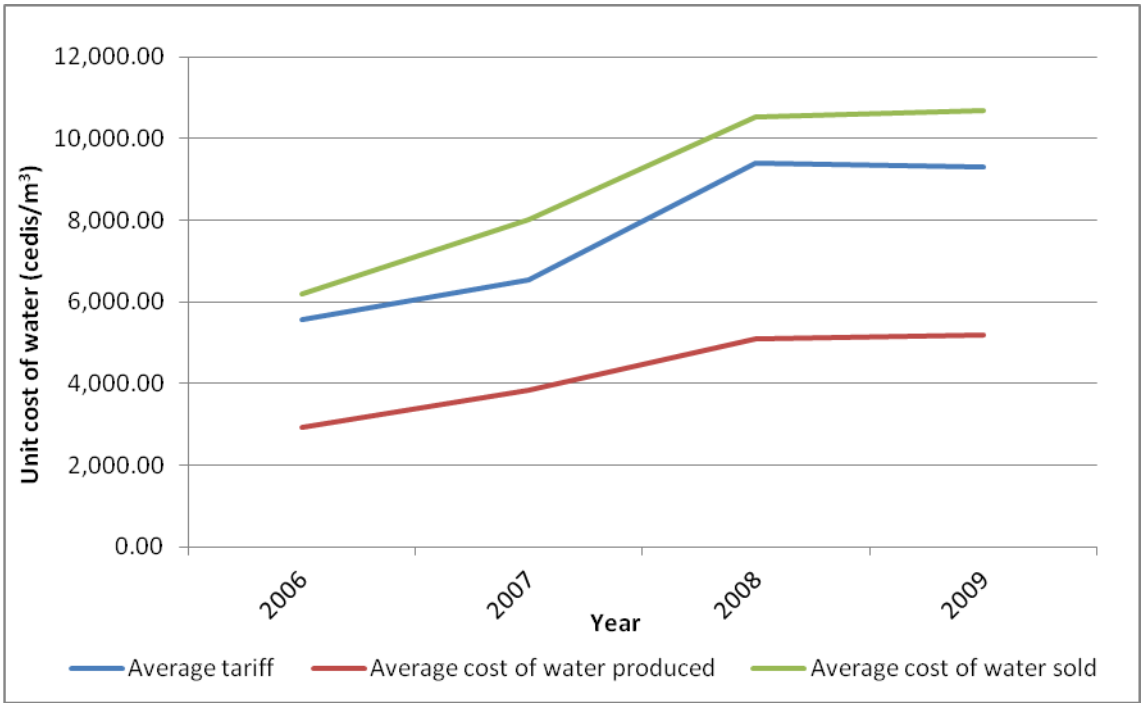


Figure 5-30 Average tariff, cost of water produced and sold, AVRL

Creditworthiness

As shown in the figure below, the utility's long-term debt to the shareholder's equity ratio improved over the period under review. Employing leverage to assess the utility's creditworthiness, the debt to equity ratios dropped from 34.2% in 2006 to 12.5% in 2011 which show a sharp departure from the other two regimes.

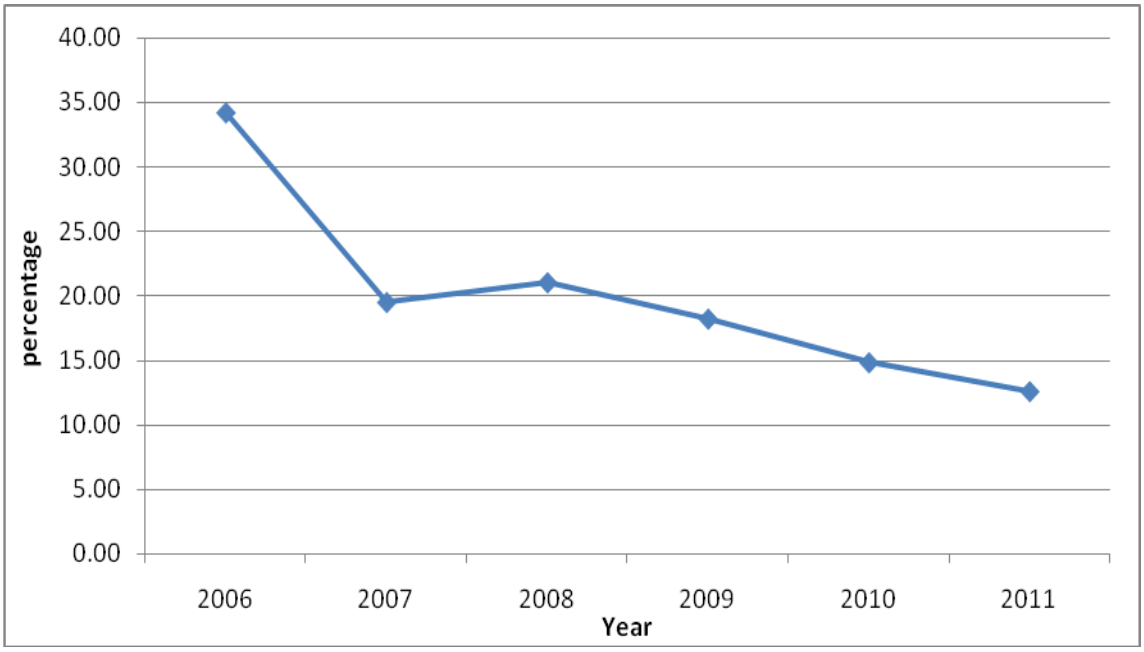


Figure 5-31 Leverage AVRL

Investments

The year of engagement of the private operator (i.e. 2006) saw the highest investment but sharply declined in subsequent years as depicted in the figure below. Further investigations also revealed that, investment plans were never followed even though the project was time-bound. Under the arrangement, a fund (i.e. Repair, Replacement and Rehabilitation (RRR) fund)was established to undertake minor repair works that were identified with an initial amount of USD$5 million. In addition, through a project fund from the Netherlands Embassy, the Grantor delivered a further USD$6.5 million.

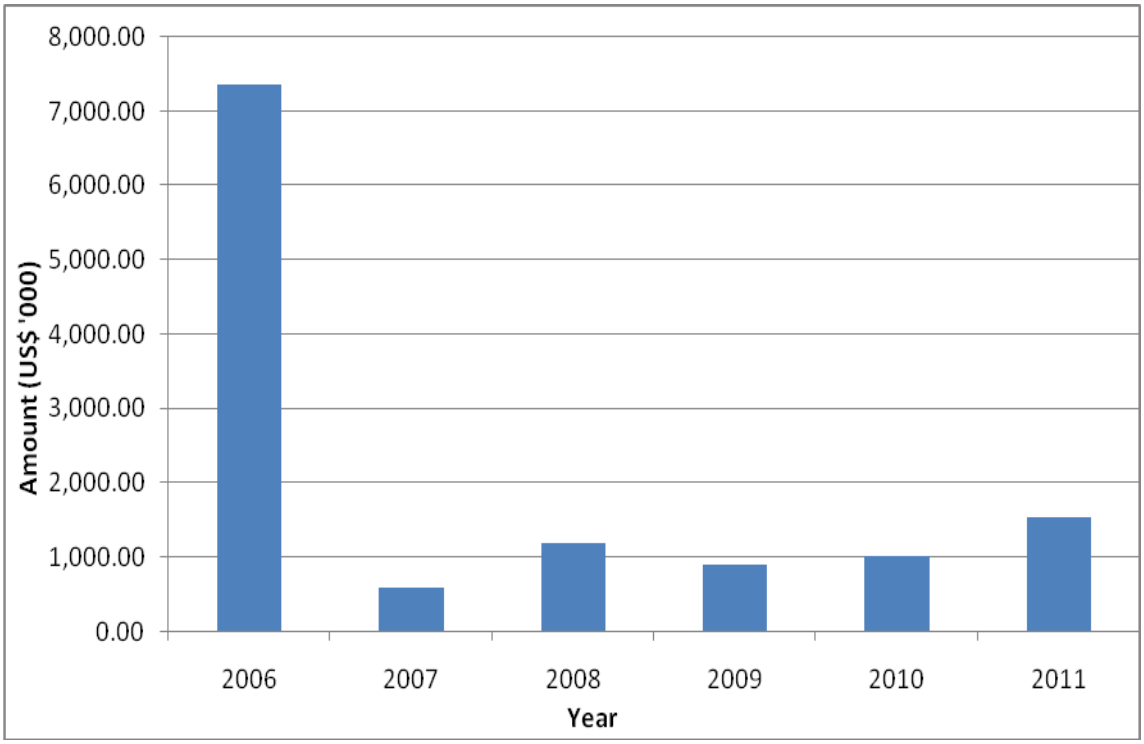


Figure 5-32 AVRL's levels of Investment. All in 2011 prices

Human resource development

Staffing levels

Labour productivity during the period of AVRL marginally but progressively improved after 2007. Its staff strength grew from 2,848 in 2006 to 3,377 in 2011 while customer strength grew from 364,000 to 481,502. During this same period, various system expansion and rehabilitation works were undertaken thereby marginally improving the number of staff per thousand customers served from 7.8 in 2006 to 7 in 2011 as depicted in the graph below.

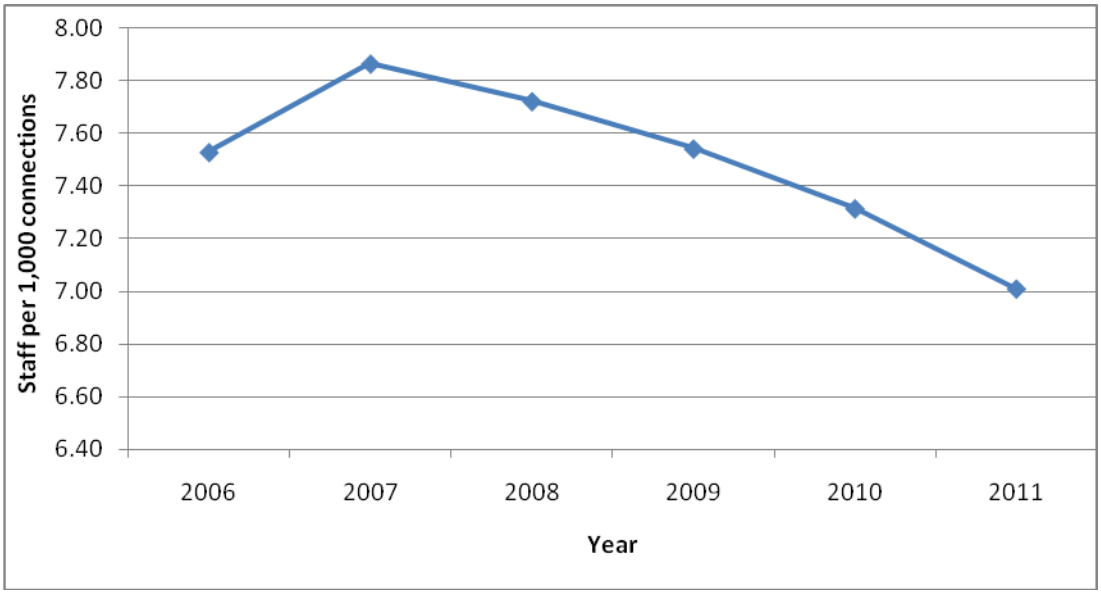


Figure 5-33 Labour productivity ratio, AVRL

Since the inception of the Management Contract, the operators aggressively pursued programmes to upgrade the skills of all categories of staff in order to achieve its corporate objectives and obligations. As staff numbers grew, 30 percent of the workforce in 2009 attained the age of more than 50 years, made up of a good number of experienced hands with long length of service. Consequently, young graduates and waterworks trainees including professional or management trainees were recruited.

Capacity building programmes were vigorously pursued by providing training for all categories of staff in various forms including technical operations, customer care, management development, health and safety, finance, planning, and ICT through conferences and workshops, seminars, lectures, on-the-job learning and training, knowledge sharing, and coaching and mentoring. On the average, 1.8 training days per employee were realised in 2009 with many employees receiving their first training since they were employed into the company. According to Management, the training greatly improved and motivated employees. In 2008, the Operator introduced a new organisational structure that sought to better serve the needs of all stakeholders, inject a stronger customer and commercial focus into the system and also help meet its corporate objectives and obligations. The structure at the AVRL Head Office is as below:

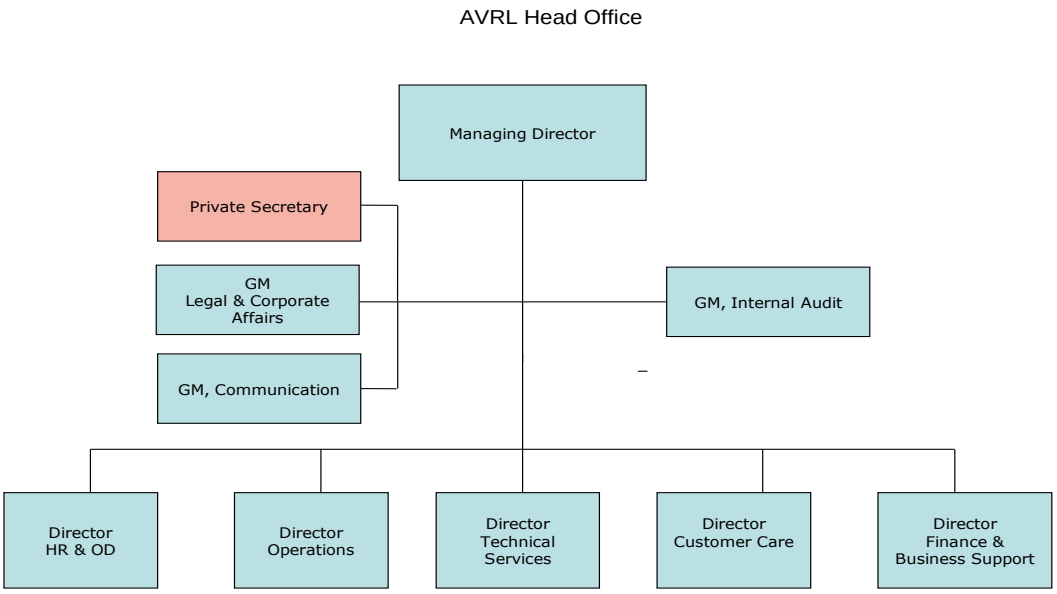


Figure 5-34 Organisational structure, AVRL

(Source: AVRL 2008 annual report)

While the existing structure at the time placed so much emphasis on hardware (i.e. engineering), the private Operator preferred a structure that is more commercial and customer focused (AVRL, 2008). The new structure was made less hierarchical and more emphasis was placed on strategies, processes and procedures. For instance, promotions were not done based on academic qualifications only but also on one's attitude and performance which conforms to any modern management structure.

The exit of AVRL in 2011

The option of involving the private operator in the management of the public water utility was never welcomed by the general public and some civil societies. No doubts, its activities were never without suspicions with frequent attacks in the media on their performance. While most customers expected rapid improvements in service provision, unnecessary bureaucratic processes such as long procurement processes kept delaying various projects and programmes, a concern that featured frequently and prominently in most reports of the private operator. Even though "*internal sabotage*" was something that most of the staff denied, somewhat, the operator faced the

challenge of *'internal sabotage'* from some senior officers who were *'in charge'* prior to the involvement of the private operator as a result of the introduction of a new structure that was very unpopular among this category of staff. Evidently, four years into the arrangement, workers began agitating and demonstrating against the performance of the private operator. The figure below was one of the placards displayed during one of such demonstrations.

Figure 5-295 Trade Union scoring of AVRL Key Performance Indicators (Source: Franceys, (2011)

According to the workers, the Operator abysmally failed in all of its obligations and therefore did not deserve to enjoy any form of contract extension – a situation which was very much envisaged at the inception of the contract. Meanwhile, further investigations revealed that, the agitating workers who called for the head of the Operator including some other senior officers who did not participate in the demonstration physically, somewhat disliked the management style and for that matter the new management structure introduced by the expatriate managers.

With the new management structure and style, the power of the *"established order"* was seen to be waning. A specific case in point was when all Regional Chief Managers who earlier on were in charge of their respective regions controlling so much resources (i.e. both human and financial) were brought to the Head Office of AVRL in Accra, re-designated as General Managers and re-assigned. Here, these senior officers could

hardly enjoy the very privileges they used to enjoy in their respective regions as Chief Managers. No doubts, it met a stiff opposition which was fiercely fought eventually resulting in their restoration.

5.5.3 Customer perception of AVRL

From Tamale, Kumasi and Accra, the views of customers were investigated with regard to the private sector operation from amongst different categories of customers drawn from the questionnaires administered to consumers in the three cities. Overall, more than 82 percent of respondents used for the survey in the three cities were already living in their respective communities prior to the engagement of AVRL in 2006. Out of the 82 percent, approximately 87 percent of respondents were customers of GWCL with piped connections with the remaining using standpipes and

Table 5-2 Length of stay of consumers in the community

		Length of stay in the community			Total
		less than 4 years	more than 4 years	4 years	
Cities	Accra	17	119	14	150
	Tamale	15	120	15	150
	Kumasi	4	172	24	200
Total		36	411	53	500

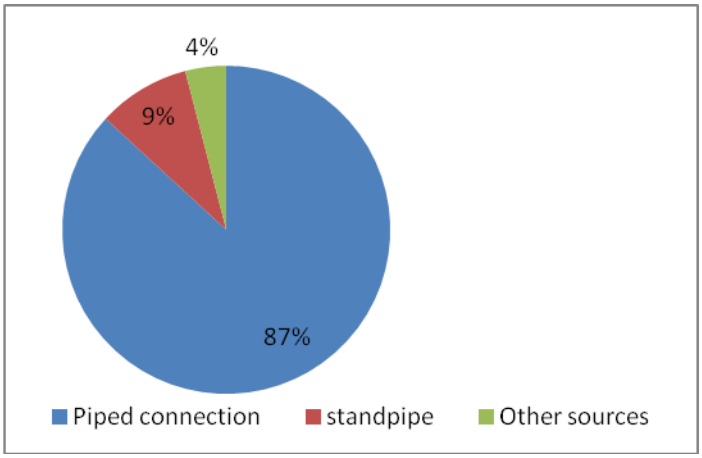


Figure 5-36 Access route to water

other alternative sources of water. This provides a good representation of those who are capable of comparing performances of the private operator and that of the earlier regimes. With the large proportion of respondents enjoying piped connections provides somewhat a good platform for fair assessment of the performance of AVRL by these customers even though results have shown that while majority of respondents knew and understood the mandate of AVRL, a good number also did not.

Quality of water supplied

Conducting a one-way between subjects ANOVA to compare the differences in quality of water supplied in the three cities; Accra, Tamale and Kumasi in terms of taste, colour and smell, the results showed that there was no significant difference in taste [F(2, 468) = 1.311, p = 0.270] and smell [F(2, 468) = 1.366, p = 0.256] among the three cites at the $p < 0.05$ level.

However, there was a significant difference in colour of water between Tamale and Accra at the $p < 0.05$ level [F (2, 468) = 3.583, p = 0.29]. Probing further with a Post hoc comparisons using the Tukey HSD test indicated that, the mean score for colour of water in Tamale (Mean = 1.7, SD = 0.587) was significantly different from that of Accra (Mean = 1.96, SD =0.860).

Table 5-3 Water quality

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Quality of water (Taste)	Between Groups	1.317	2	.659	1.311	.270
	Within Groups	235.057	468	.502		
	Total	236.374	470			
Quality of water (Colour)	Between Groups	4.969	2	2.485	3.583	.029
	Within Groups	324.500	468	.693		
	Total	329.469	470			
Quality of water (Smell)	Between Groups	1.577	2	.789	1.366	.256
	Within Groups	270.159	468	.577		
	Total	271.737	470			

Table 5-4 Water quality

Multiple Comparisons

Tukey HSD

Dependent Variable	(I) Towns	(J) Towns	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Quality of water (Taste)	Accra	Tamale	.109	.085	.408	-.09	.31
		Kumasi	-.012	.078	.987	-.20	.17
	Tamale	Accra	-.109	.085	.408	-.31	.09
		Kumasi	-.122	.079	.276	-.31	.06
	Kumasi	Accra	.012	.078	.987	-.17	.20
		Tamale	.122	.079	.276	-.06	.31
Quality of water (Colour)	Accra	Tamale	.261*	.100	.026	.02	.50
		Kumasi	.077	.092	.684	-.14	.29
	Tamale	Accra	-.261*	.100	.026	-.50	-.02
		Kumasi	-.184	.093	.119	-.40	.03
	Kumasi	Accra	-.077	.092	.684	-.29	.14
		Tamale	.184	.093	.119	-.03	.40
Quality of water (Smell)	Accra	Tamale	.116	.092	.414	-.10	.33
		Kumasi	-.018	.084	.974	-.22	.18
	Tamale	Accra	-.116	.092	.414	-.33	.10
		Kumasi	-.135	.085	.254	-.33	.07
	Kumasi	Accra	.018	.084	.974	-.18	.22
		Tamale	.135	.085	.254	-.07	.33

*. The mean difference is significant at the 0.05 level.

But generally, respondents from all three cities expressed satisfaction in respect of quality of water supplied in terms of colour, smell and taste.

Continuity of flow

A one-way between subjects ANOVA was conducted to compare the differences in daily duration of flow of water among the three cities; Accra, Tamale and Kumasi. From table 5-5 below, the results showed that statistically, there were significant differences in the number of hours water flowed in the three cities in a day [$F(2, 468) = 101.182$, $p = 0.000$] at the $p < 0.05$ level. But with a Post hoc comparisons using the Tukey HSD test indicated that, the mean score for number of hours that water flowed daily in

Tamale (Mean = 3.01, SD = 1.215) and Kumasi (Mean = 3.05, SD =0.763) were significantly different from Accra (Mean = 1.66, SD =0.935). Generally, majority of respondents in Accra reported of poor water supply services and non-flow.

Table 5-5 Continuity of water flow in a day

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	187.231	2	93.615	101.182	.000
Within Groups	433.003	468	.925		
Total	620.234	470			

Multiple Comparisons

Table 5-6 Continuity of water flow in a day

Tukey HSD

(I) Towns	(J) Towns	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Accra	Tamale	-1.358*	.116	.000	-1.63	-1.08
	Kumasi	-1.394*	.106	.000	-1.64	-1.14
Tamale	Accra	1.358*	.116	.000	1.08	1.63
	Kumasi	-.036	.108	.939	-.29	.22
Kumasi	Accra	1.394*	.106	.000	1.14	1.64
	Tamale	.036	.108	.939	-.22	.29

*. The mean difference is significant at the 0.05 level.

Among the three cities, according to majority of respondents in Tamale, they enjoyed a 24-hour water flow. This was as a result of system expansion works undertaken on the Tamale water supply system just before the contract was executed. While more than 60 percent of respondents in Accra received water for less than 4 hours in a day, in Kumasi water flowed between 8 and 16 hours in a day as shown in figure 5-37. Accra continued to experience water rationing mostly along the western corridor of Accra due to an ongoing rehabilitation work at the time.

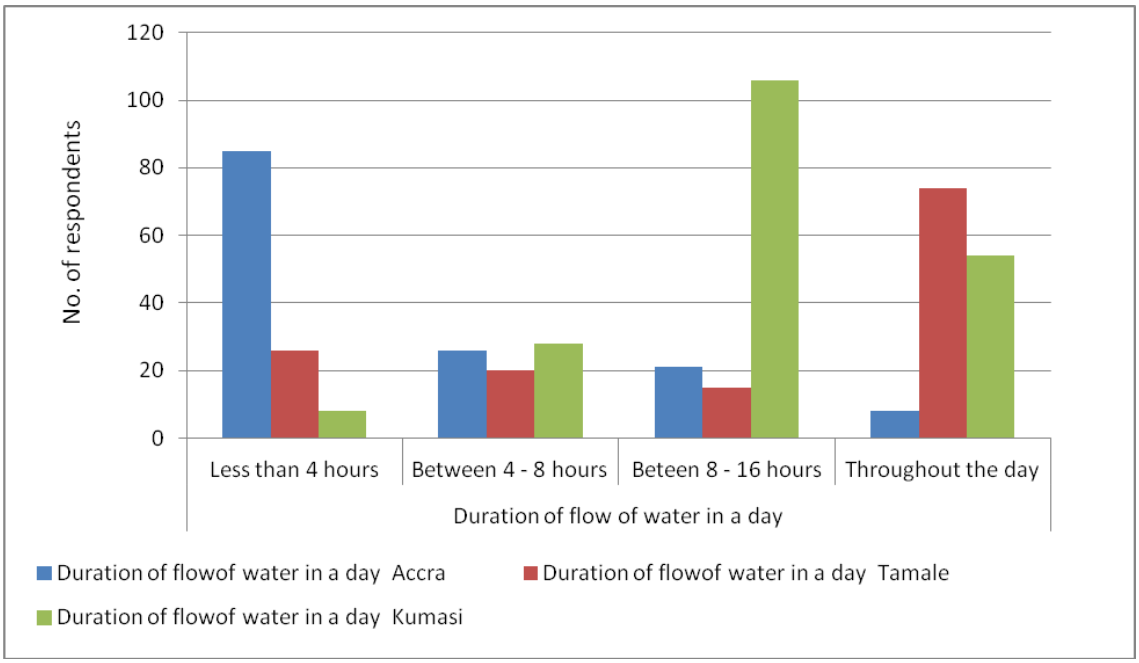


Figure 5-37 Continuity of water flow

It must however be pointed out that a strange phenomenon existed in Accra. Here, albeit the main water pipelines run through Adenta through to East Legon, customers in East Legon were enjoying a 24-hour water supply services, residents of Adenta Trotro station, Commando, SNNIT flats and Housing area could hardly enjoy water flowing through their taps up to 4 hours in a day. Again, water could hardly flow under sufficient pressure in these communities. This challenge was traced to some "*Water-Lords*" in these communities who were illegally diverting the water from the main pipelines into their private reservoirs and later sell at usurious prices to consumers. It was however reported that some staff of the water utility were involved in this dubious and clandestine activities. This is because the phenomenon was known to the water utility staff but failed to act.

Four years into the operations of the private operator, more than 66 percent of respondents in Accra saw no improvement in the services of the operator probably due to water rationing in Accra at the time. Meanwhile, majority of consumers in Tamale stated that, services improved during the period of AVRL as shown in figure 5-38. Water supply services could be said to be relatively good in Tamale.

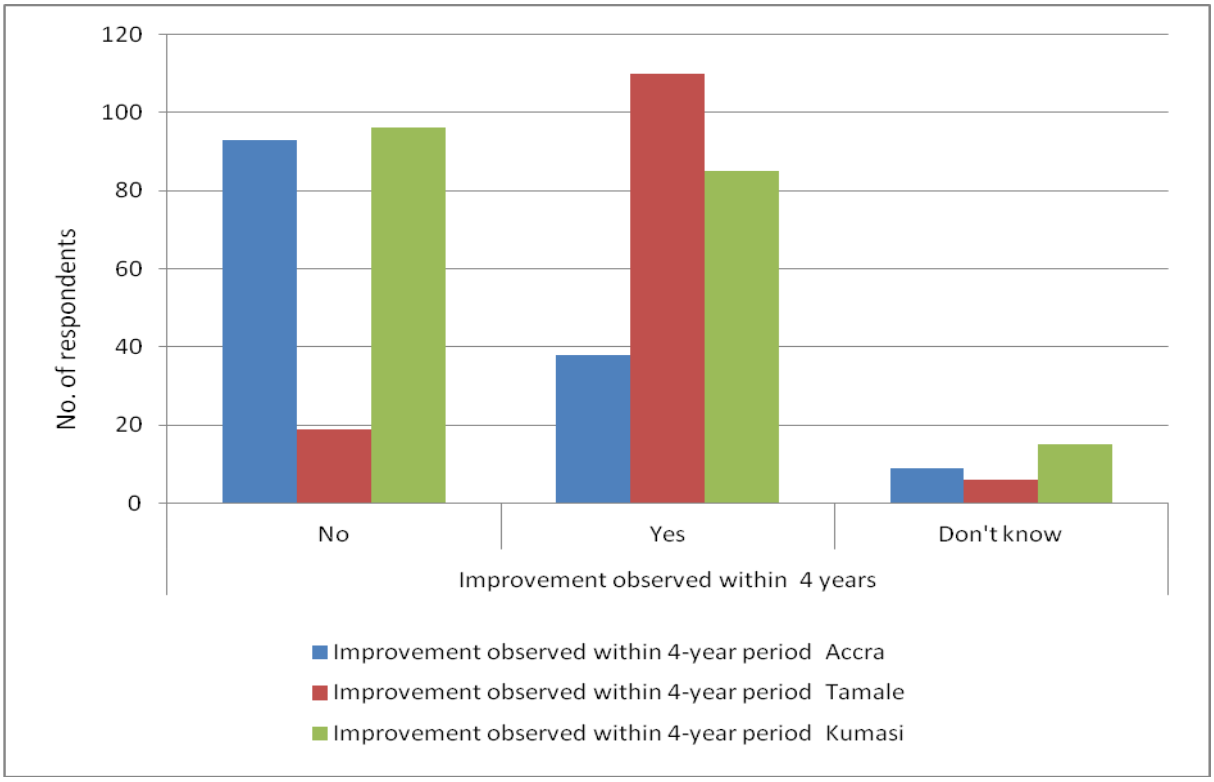


Figure 5-38 Improvement in services

Respondents' position on the renewal of contract

Overwhelmingly, respondents in Accra were opposed to the renewal of the contract as depicted in figure 5.39 below. Similarly in Kumasi, respondents were not in support of the renewal of the contract upon expiration. It is however worthy to state that several factors accounted for this position held by respondents especially in Accra. For instance, in addition to the shortfall in water supply in Accra at the time the researcher was undertaking the survey, there was a major rehabilitation work taking place along the western corridor of Accra and this further worsened the water supply situation. During the period of this survey, water supply services (i.e. water flow) were very irregular in Accra resulting in long periods of water rationing. It is therefore believed that this situation largely influenced some of the customers in Accra who vehemently opposed the renewal or extension of the contract. Other factors that also influenced respondents' positions were people's political affiliations and orientation. Apparently many respondents also assigned the responsibility of capital investments for infrastructural development to the private operator, and this also might have influenced their judgements against the operator

since they were expecting more from the operator than what the arrangement stipulated.

Meanwhile, a good number of respondents also failed to state whether or not the contract should be renewed as in the case of consumers in Kumasi who remained indifferent in respect of the need for the private operator to be engaged in the urban water supply sector of Ghana by Government.

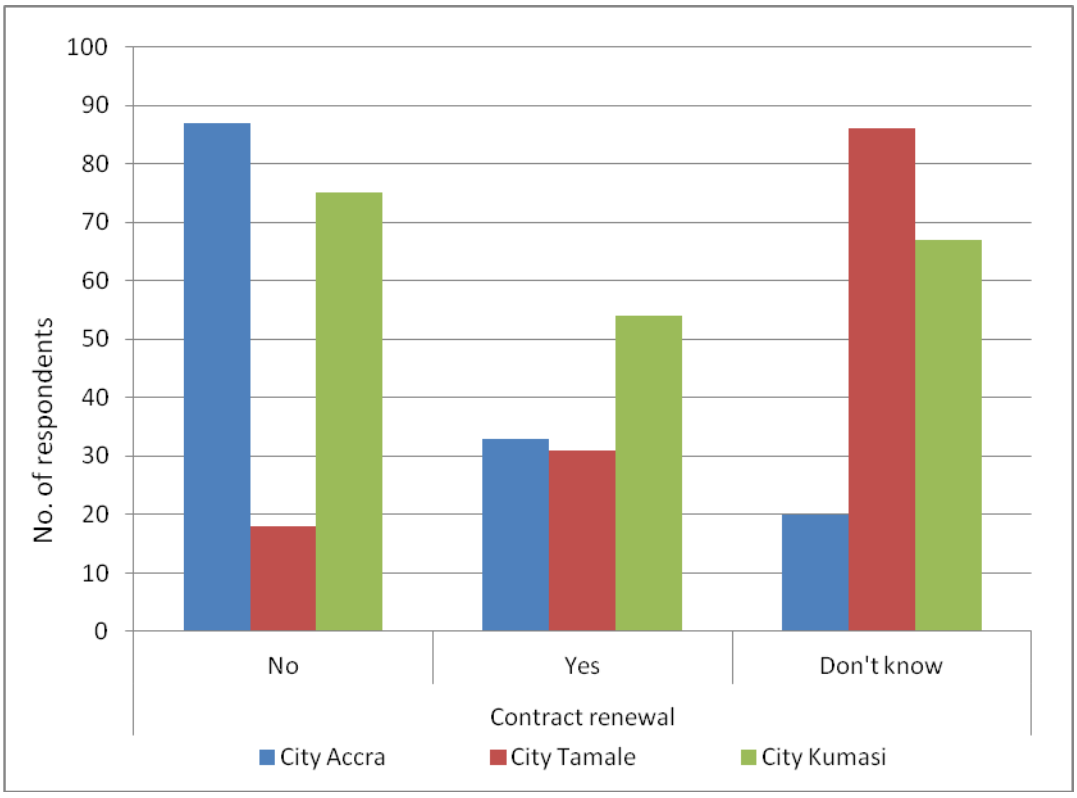


Figure 5-39 Renewal of contract

While respondents in Tamale observed significant improvements in service delivery including billing, bill collection and attitude of staff towards customers, respondents in Accra complained of lack of notification towards service interruptions and sluggish attitude of staff towards customer complaints.

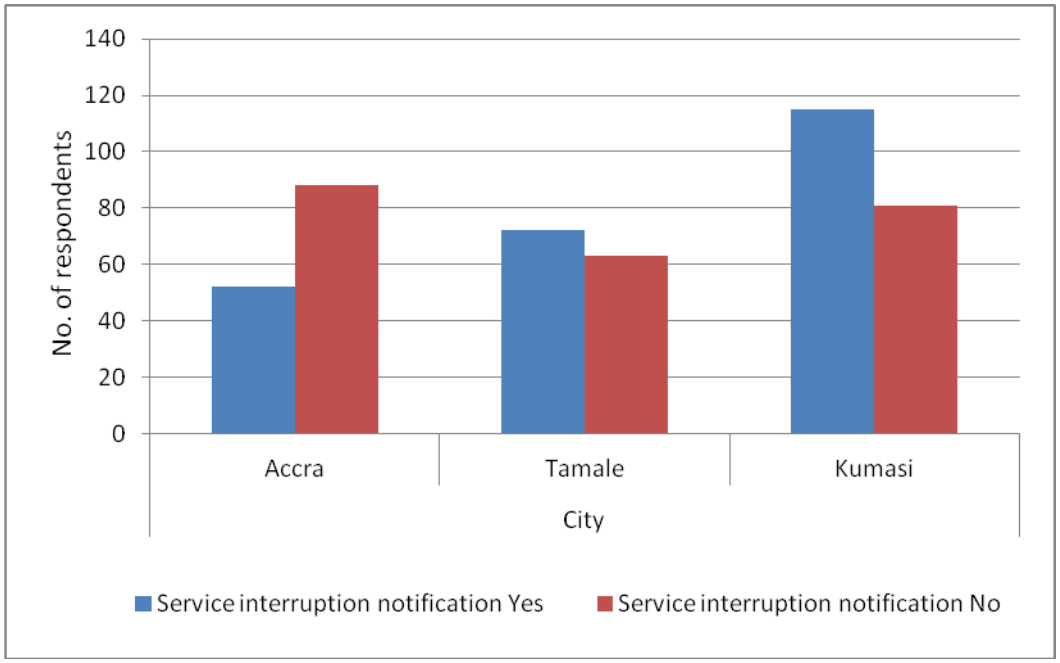


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Figure 5-40 Service interruption notification

Metering and bill collection

In all three cities, majority of the respondents' account were metered and billing was done monthly. But interestingly, while majority of the respondents in both Accra and Kumasi would prefer their accounts to be metered, same could not be said about responts in Tamale. However, further investigation revealed that most of the consumers whose accounts were not metered but given flat rates to pay, sell water to other consumers who are not connected in their communities or get water through other alternative sources. This is one of the reasons why a customer will prefer his or her account to be unmetered.

Customers at Adenta Trotro station, Commando, SNNIT flats and Housing were in default for more than two months. This situation was however blamed on poor service delivery in these areas and lack of adequate revenue collection points and also the unaggressive attitude of the water utility towards bill collection. Meanwhile, non-payment of bills and illegal connections were two main reasons why customers or consumers were disconnected in all three cities.

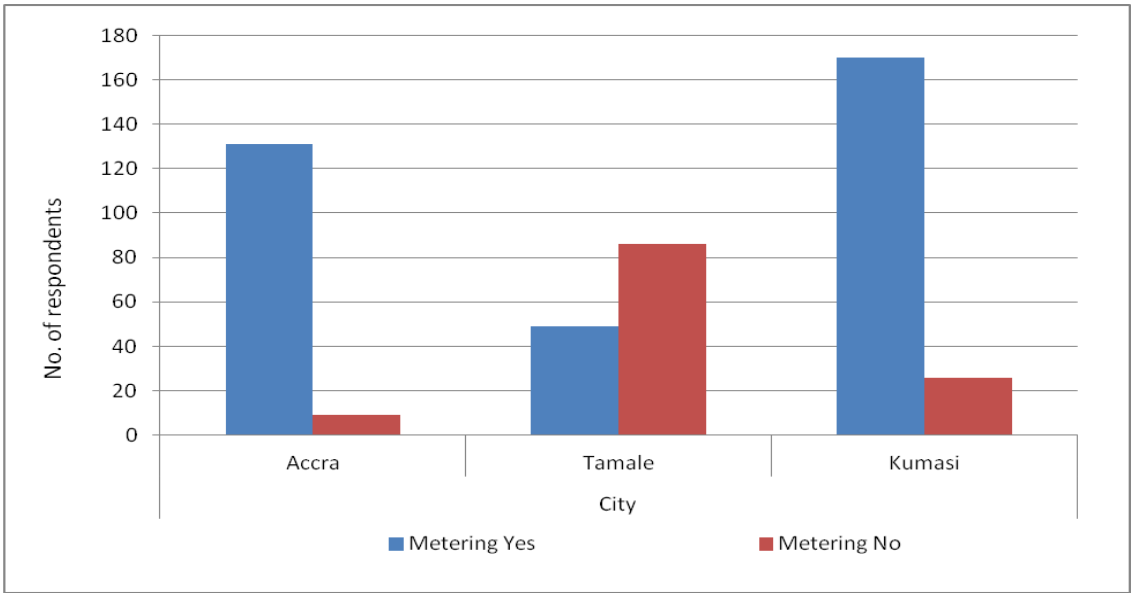


Figure 5-42 Metering preference

Overall, non-flow and irregular flow of water, long delays in responding to customer complaints and wrongful disconnections were major areas of concern to majority of the customers. About 73 percent of respondents stated that adequate investment towards infrastructural development in the urban water supply sector of Ghana is crucial and critical. Customers however believed that, the water utility must remain strictly a public utility.

Perceptions after the exit of the Private operator (AVRL) in 2011

A post-mortem assessment was finally conducted in 2013 on the performance of AVRL employing different categories of customers in two of the three cities, Tamale and Accra through sixty household surveys. Additionally, some staff of AVRL, GWCL and PURC were interviewed in order to cover a broad spectrum of perceptions held on the performance of AVRL. In Tamale, 86.7%, 76.7% and 83.3% interviewees indicated that billing, bill collection and staff-customer relations respectively improved during the period of AVRL but observed a slight decline from 2012. While 43% of the customers in Tamale felt that AVRL did its best under the circumstance, 60% believed that the involvement of AVRL made water tariffs to go up during the period. Generally, the interviewees expressed satisfaction in respect

of their operations and added that as long as the old staffs were still in place, it will take more time than five years to effect any significant changes.

In Accra, more than 67% of the interviewees indicated that water supply improved towards the end of the tenure of AVRL and this observation was corroborated by staff of AVRL, PURC and GWCL. It was explained that, most of the repair and rehabilitation works took place in the ATMA area and these projects were either completed or near completion towards the end of 2010 and hence the improvement in water supply in 2011. About 57% of interviewees also observed that the private operator adopted more efficient and aggressive approach to billing and bill collection during the period. Customers however bitterly complained of frequent interruptions in water supply without prior notice and even if they are informed of when water would be restored, the water utility fails to honour its own promise. Generally, interviewees did not see much difference between the number of hours that water flowed through their taps before and during the period of AVRL. In view of this, the interviewees were not very much enthused about the decision of Government to engage the private operator but intimated that it would require more years to effect the need change.

While some staff of AVRL somewhat praised and believed that the private operator did the best it could under the circumstance, others said that the expatriates came only *"to make money for themselves and left*". The engagement of AVRL was also condemned vehemently by majority of staff of the Grantor (i.e. GWCL) interviewed stating that, it was a worthless venture since GWCL could have performed better if the same amount of resources were made available to GWCL. They further intimated that the Grantor could hardly monitor the activities of the private operator to ascertain the true picture on the ground especially in respect of water treatment, chemical usage and quality of water produced. It was however revealed that, officers responsible for monitoring these activities of the private operator were inadequately resourced logistically to undertake their tasks. In addition, the challenge of salary disparities between staff of GWCL on secondment to AVRL and staff of GWCL featured prominently - a major source of worry and frustration to many staff of the Grantor (GWCL). Consequently, some workers of GWCL simply and angrily described the contract as "*vague, bogus and suppressive*". Finally, the staff of PURC interviewed intimated that the policy environment was unfavourable for successful private participation in the urban water supply sector and added that vested interests were not carefully and strategically dealt

with in the contract. They concluded that there were some marginal improvements in respect of staff training, bill collection and staff-customer relations.

6 Performance Comparison GWSC (1992-1998), GWCL (1998-2005) and Aqua Vitens Rand Limited (2006-2011)

This Chapter compares the key performance indicators that best assess the performance of AVRL during its 5-year contract period as against a 7-year period each of Ghana Water and Sewerage Corporation and Ghana Water Company Limited. This is to ensure that the 7-year operations of GWCL were fully considered and the performance of the public utility before Ghana entered into its fourth republic in 1993 (GWSC) is also covered. In performing the t-tests on all three regimes (i.e. GWSC, GWCL and AVRL), the possibility of having a family-wise error rate became apparent. In this case, at least there could be a false positive result and in mitigating the risk and control for false positives for reliability, Bonferroni correction was employed. Additionally, paired analyses of the three regimes were done, two at a time to determine specific differences since Microsoft Office Excel does not include standard multiple comparison test in its ANOVA output. The t-test and analysis of variance (ANOVA) were used to compare the performance of the three regimes of the public utility operators in Ghana.

6.1.1 Water production

Water production slowly increased from 195Mm^3 to 211Mm^3 during the 7-year period of GWCL. Similarly, it consistently increased during the 5-year period of AVRL from 212Mm^3 to 249$Mm^{3.}$ Urban water coverage in 2006 was 56 percent with a production level of 212Mm3 when AVRL was engaged. Generally, water production lagged far behind the rate of growth of the urban population in Ghana. From 1987 to 1998, water production levels fluctuated between 159.3Mm^3 in 1988 and 185.86Mm^3 in 1997. Except in 2000, production increased consistently under GWCL as a result of installations of higher capacity plants during the period. Similarly under the AVRL, production successively increased from 211.7Mm^3 in 2006 to 248.98$Mm^{3.}$ During regimes of all the service entities, water production lagged behind the rate of growth of the urban population due to lack of prudent management and investment in the sector.

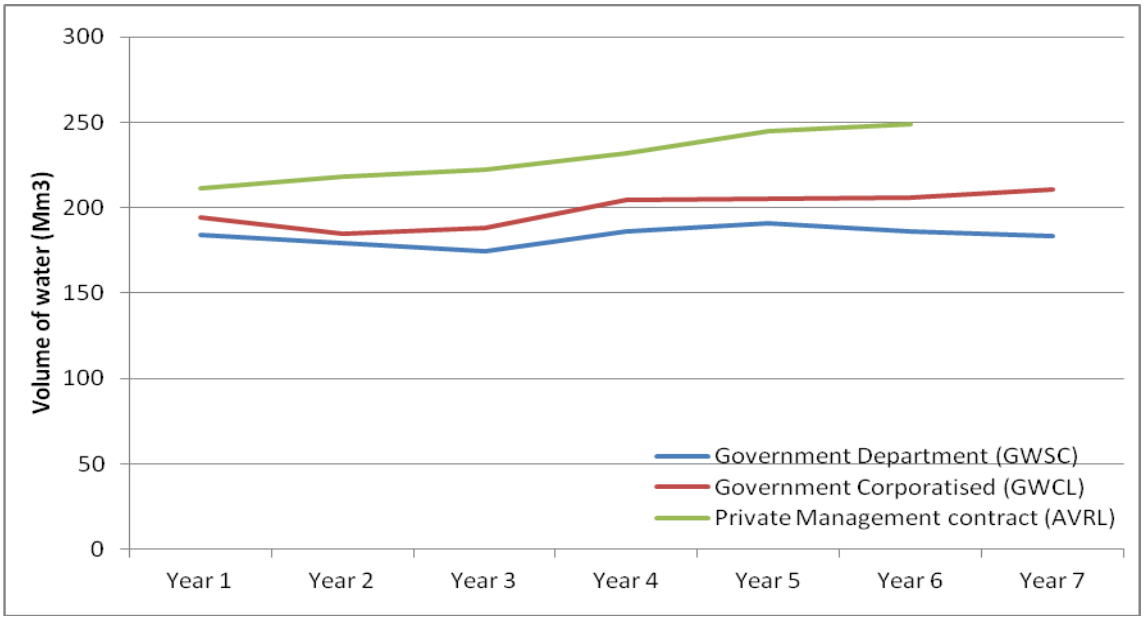


Figure 6-1 Water production rates comparison

In the ANOVA Table 6-1 below, the test statistics F (2, 15) is 26.82 and p<0.001 (p=1.11292E-05). This shows that there is strong evidence that there are significant differences in the means of volume of water produced per annum across the groups at 5% level of significance. Furthermore, with the 3-pairwise comparisons among GWSC, GWCL and AVRL as depicted in the t-Test Tables 6-2, 6-3 and 6-4 below confirm the above result. A paired test performed for GWSC and GWCL to determine if water production per annum increased when the public utility became a limited liability company, shows that (M = 16.58, S.D = 12.97, N = 6) was significantly greater than

Table 6-1 ANOVA output for water production

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
GWSC	6	1100.23	183.3716667	33.06193667
GWCL	6	1199.72	199.9533333	112.4989867
AVRL	6	1377.584	229.5973333	222.5228827

Source of variance	**SS**	**df**	**MS**	**F**	**P-value**	**F crit**
Between Groups	6581.061328	2	3290.530664	26.81887068	1.11292E-05	3.682320344
Within Groups	1840.41903	15	122.694602			
Total	8421.480358	17				

Table 6-2 t-Test: Paired Two Sample for Means

	GWSC	*GWCL*
Mean	183.3716667	199.9533333
Variance	33.06193667	112.4989867
Observations	6	6
Pearson Correlation	0.773581012	
Hypothesized Mean Difference	0	
df	5	
t Stat	-5.676129555	
P(T<=t) one-tail	0.001181529	
t Critical one-tail	2.015048372	
P(T<=t) two-tail	0.002363058	
t Critical two-tail	2.570581835	

Column1	
Mean	-16.58166667
Standard Error	2.921298132
Median	-16.41
Mode	#N/A
Standard Deviation	7.155689811
Sample Variance	51.20389667
Kurtosis	0.519681201
Skewness	0.072297312
Range	21.15
Minimum	-27
Maximum	-5.85
Sum	-99.49
Count	6
Confidence Level(95.0%)	7.509435913

zero, t (5) = -5.68, two tail p = 0.0024, providing the evidence that water production levels per annum improved between 1999 and 2006. At 95% confidence interval, mean increase in water produced per annum is (24.09, 9.07).

Similarly, a paired test conducted for GWSC and AVRL to determine if water production during the period of the private operator saw some improvements over that

of GWSC, shows that the mean increase in water production per annum (M =46.23, S.D = 12.97, N = 6) was significantly greater than zero, t(5) = -8.73, two tail p = 0.0003, providing evidence that water production levels per annum improved during the period of AVRL over that of GWSC. At 95% Confidence Interval, mean increase in water produced per annum is (32.61, 59.84)

Table 6-3 t-Test: Paired Two Sample for Means

	GWSC	*AVRL*
Mean	183.3716667	229.5973333
Variance	33.06193667	222.5228827
Observations	6	6
Pearson Correlation	0.508928784	
Hypothesized Mean Difference	0	
df	5	
t Stat	-8.728560535	
P(T<=t) one-tail	0.000163436	
t Critical one-tail	2.015048372	
P(T<=t) two-tail	0.000326871	
t Critical two-tail	2.570581835	

Column1	
Mean	-46.22566667
Standard Error	5.295909501
Median	-42
Mode	#N/A
Standard Deviation	12.972276
Sample Variance	168.2799447
Kurtosis	-1.221600351
Skewness	-0.741080316
Range	32.78
Minimum	-65.38
Maximum	-32.6
Sum	-277.354
Count	6
Confidence Level(95.0%)	13.61356876

A paired test conducted for GWCL and AVRL to determine if water produced per annum during the period of the private operator saw some improvements over that of GWCL shows that the mean increase in water production per annum (M = 29.64, S.D = 7.87, N = 6) was significantly greater than zero, t(5) = -9.23, two tail p = 0.0003, providing evidence that water production levels per annum improved during the period of AVRL over that of GWCL. At 95% Confidence Interval, mean increase in water produced per annum is (37.90, 21.41)

Table 6-4 t-Test: Paired Two Sample for Means

	GWCL	*AVRL*
Mean	199.9533333	229.5973333
Variance	112.4989867	222.5228827
Observations	6	6
Pearson Correlation	0.863173478	
Hypothesized Mean Difference	0	
df	5	
t Stat	-9.230824151	
P(T<=t) one-tail	0.000125301	
t Critical one-tail	2.015048372	
P(T<=t) two-tail	0.000250603	
t Critical two-tail	2.570581835	

Column1	
Mean	-29.644
Standard Error	3.211414226
Median	-28.2
Mode	#N/A
Standard Deviation	7.866326207
Sample Variance	61.879088
Kurtosis	-0.61902559
Skewness	0.169275396
Range	20.564
Minimum	-38.534
Maximum	-17.97
Sum	-177.864
Count	6
Confidence Level(95.0%)	8.255203074

In conclusion, there is a strong evidence that successively, the interventions of Managements and Governments over the years improved water production levels with the private operator (AVRL) recording the highest average water production level of 229.597 Mm^3 per annum over the 5-year period.

6.1.2 Non-revenue water

Even though high non-revenue water figures were recorded during the three regimes, the most intriguing feature is the inability of all three regimes to substantially reduce non-revenue water. Somewhat, AVRL steadily but marginally reduced its non-revenue water from 52.72% in 2006 to 49.22 in 2011 even though by the contract, it was expected to exit with a non-revenue water of not more than25 percent, it failed abysmally. Surprisingly, a marginal increase in metering from 48% in 2005 to 59.2% in 2011also failed to produce a corresponding effect on non revenue water.

Finally, lack of planning in the cities over the years has culminated into springing up of all sorts of structures and buildings everywhere in the cities without requisite documentation and approval from city authorities. Thus promoting various classes of slams in the cities where people could easily connect water to their homes illegally a coupled with low metering make it most unlikely for non-revenue water to be ever reduced below 40% in Ghana.

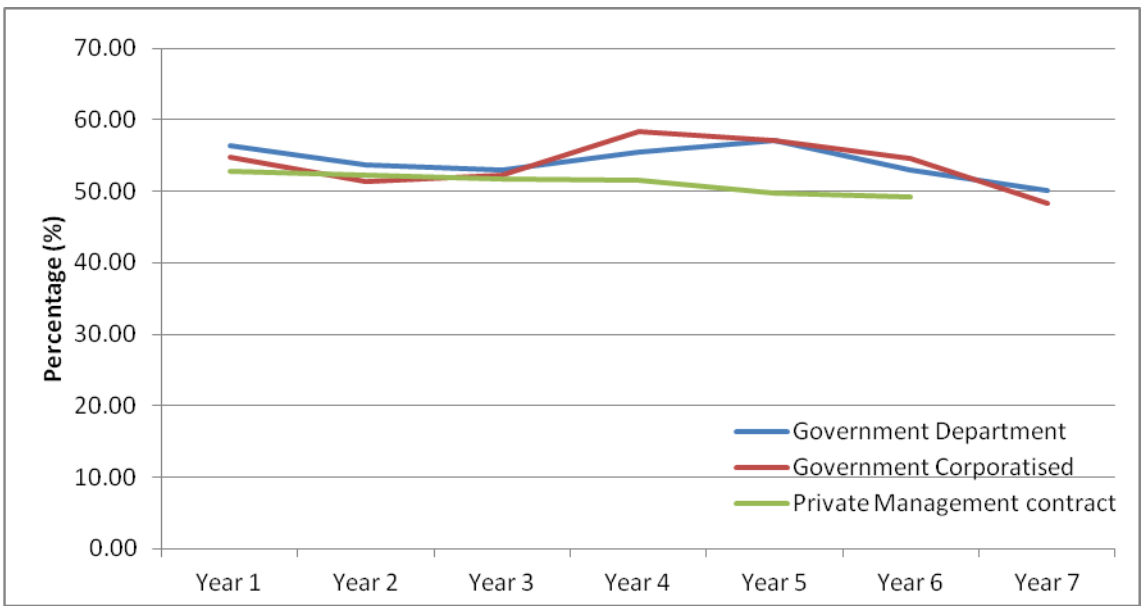


Figure 6-2 Non-revenue water comparison

From 1987 to 1998, high non-revenue water values were recorded under GWSC ranging between 50.98% and 62.71%. However, the trend of high non-revenue water remained unchanged under GWCL with fluctuating ratios between 48.3% in 2005 and 58.2% in 2002. No improvement could be seen under the private operator during the 5-year period. Non-revenue water values were high ranging between 52.72% in 2006 and 49.22% in 2011.

Table 6-5 ANOVA output for Non-revenue Water

Groups	*Count*	*Sum*	*Average*	*Variance*
GWSC	6	322.1656054	53.69426756	5.622413118
GWCL	6	321.9068812	53.65114687	14.25669467
AVRL	6	307.286154	51.214359	1.95089089

Source of variance	**SS**	**df**	**MS**	**F**	**P-value**	**F crit**
Between Groups	24.17948204	2	12.08974102	1.661439544	0.222962371	3.682320344
Within Groups	109.1499934	15	7.276666227			
Total	133.3294754	17				

In the ANOVA Table 6-5 above, the test statistics F (2, 15) is 1.66 and p>0.001 (p=0.22). This shows that there is no strong evidence that there are significant differences in the means of non-revenue water across the three groups at 5% level of significance. Investigating further with 3-pairwise comparisons among the regimes as depicted in the t-Test Tables 6-6, 6-7 and 6-8.

Table 6-6 t-Test: Paired Two Sample for Means

	GWSC	*GWCL*
Mean	53.69426756	53.65114687
Variance	5.622413118	14.25669467
Observations	6	6
Pearson Correlation	0.880758614	
Hypothesized Mean Difference	0	
df	5	
t Stat	0.052111967	
P(T<=t) one-tail	0.480228686	
t Critical one-tail	2.015048372	

P(T<=t) two-tail	0.960457372
t Critical two-tail	2.570581835

Column1	
Mean	0.04312069
Standard Error	0.827462341
Median	0.366556079
Mode	#N/A
Standard Deviation	2.026860518
Sample Variance	4.10816356
Kurtosis	-1.007872179
Skewness	-0.543599066
Range	5.245121687
Minimum	-2.987034821
Maximum	2.258086866
Sum	0.258724142
Count	6
Confidence Level(95.0%)	2.127059664

A paired test performed for GWSC and GWCL to determine if non-revenue water improved after the public utility became a limited liability company shows that mean non-revenue water reduction (M = 0.04, S.D = 2.03, N = 6) was insignificantly greater than zero, t (5) = 0.05, two tail p = 0.96, providing the evidence that GWCL recorded no significant improvement in non-revenue water from 1999 and 2006. A 95% confidence interval, about mean improvement in non-revenue water is (2.08, 2.17).

Table 6-7 t-Test: Paired Two Sample for Means

	GWSC	*AVRL*
Mean	53.69426756	51.214359
Variance	5.622413118	1.95089089
Observations	6	6
Pearson Correlation	0.558623445	
Hypothesized Mean Difference	0	
df	5	
t Stat	3.086615867	
P(T<=t) one-tail	0.013631987	
t Critical one-tail	2.015048372	
P(T<=t) two-tail	0.027263975	
t Critical two-tail	2.570581835	

Column1	
Mean	2.479908564
Standard Error	0.803439323
Median	2.013113469
Mode	#N/A
Standard Deviation	1.968016381
Sample Variance	3.873088478
Kurtosis	-1.154154038
Skewness	0.649456991
Range	4.824508922
Minimum	0.679503338
Maximum	5.50401226
Sum	14.87945138
Count	6
Confidence Level(95.0%)	2.06530653

Similarly, a paired test conducted for GWSC and AVRL to determine if non-revenue water levels were better during the period of the private operator than that of GWSC, shows that the mean improvement in non-revenue water (M =2.48, S.D = 1.97, N = 6) was insignificantly greater than zero, t(5) = 3.09, two tail p = 0.03, providing evidence that non-revenue water marginally improved during the period of AVRL over that of GWSC. A 95% Confidence Interval, about mean improvement in non-revenue water is (0.42, 4.55)

Table 6-8 t-Test: Paired Two Sample for Means

	GWCL	*AVRL*
Mean	53.65114687	51.214359
Variance	14.25669467	1.95089089
Observations	6	6
Pearson Correlation	0.295949461	
Hypothesized Mean Difference	0	
df	5	
t Stat	1.650021791	
P(T<=t) one-tail	0.079925637	
t Critical one-tail	2.015048372	
P(T<=t) two-tail	0.159851273	
t Critical two-tail	2.570581835	

Column1	
Mean	2.436787873
Standard Error	1.476821632
Median	2.304273926
Mode	#N/A
Standard Deviation	3.617459439
Sample Variance	13.08601279
Kurtosis	-2.80405815
Skewness	0.084570521
Range	8.122031975
Minimum	-1.361687586
Maximum	6.760344389
Sum	14.62072724
Count	6
Confidence Level(95.0%)	3.79629086

Finally, a paired test conducted between GWCL and AVRL to determine if non-revenue water during the period of the private operator was lower than that of GWCL, shows that the mean improvement in non-revenue water (M =2.44, S.D = 3.62, N = 6) was insignificantly greater than zero, t(5) = 1.65, two tail p = 0.16, providing the evidence that averagely, non-revenue water marginally improved by 2.4% during the period of AVRL over that of GWCL. A 95% Confidence Interval, about mean improvement in non-revenue water is (1.36, 6.23). But overall, all three regimes displayed high levels of operational inefficiencies and ineffectiveness.

6.1.3 Days receivables ratio and bill collection efficiency

In Ghana, bill collection has always been a major challenge to most public utilities that provide post-paid services including the Volta River Authority (VRA), Electricity Company of Ghana and Water utilities. Evidently, average number of days used in receiving revenues worsened from 108 days in 2005 to159 days in 2006. Nonetheless, this could be tolerated since the expatriates began work in June, 2006 and therefore knew little about the system they were managing at the time. Meanwhile, AVRL failed to record lower ratios in subsequent year though Management contract is usually considered as a model that is effective in respect of revenue collection. From 1992 to 2011, the best ratio was registered in 2005 (i.e. 108 days) under GWCL.

The Corporation's introduction of Arrears Recovery Programme (ARP) to improve its commercial operations in meter reading, bill distribution, arrears collection and prepayment metering engaged a private company, Messrs Delaram and this led to the collection of 563 million cedis within six months from June 1998 (GWSC, 1998). In 1998 alone, over 2 billion cedis was collected as part of the arrears of MDAs. A tariff increase of 130 percent granted to GWSC by the newly established PURC in 1998 improved both billing and collection performances during the year in terms of cash compared to the previous year. Meanwhile, overall collection efficiency further declined in 1998 due to government's failure to honour about 65 percent of its bills. As shown in figure 5-3, bill collection efficiency for private customers has been more than that of Government, a situation that has continued to affect the operations of the water utility greatly. Albeit, government pays its bills full, payments are usually unduly delayed. Somewhat, while one may agree with the above reasons, lack of adequate bill collection centres also contributed to the low bill collection in respect of private customers.

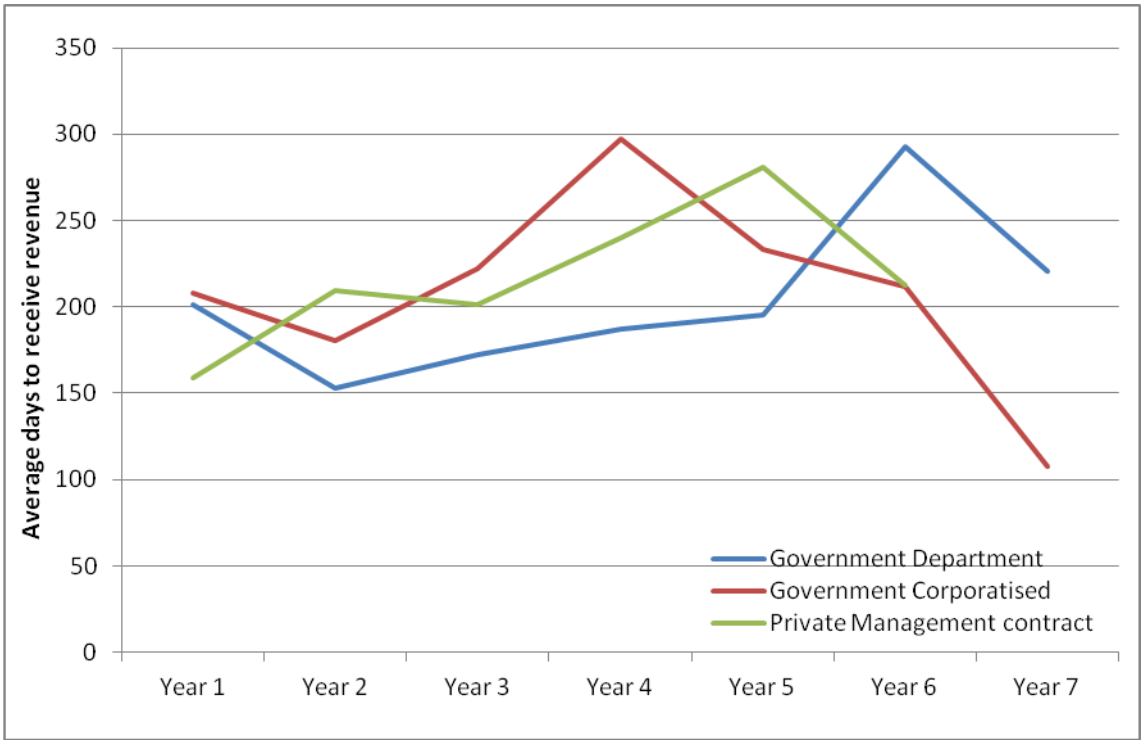


Figure 6-3 Days receivables ratio comparison

Table 6-9 ANOVA output for days receivables

Groups			
Count	*Sum*	*Average*	*Variance*
GWSC 6	1220.606289	203.4343814	2419.793118
GWCL 6	1253.205287	208.8675478	3951.596112
AVRL 6	1303.080068	217.1800113	1671.671763

Source of variance	**SS**	**df**	**MS**	**F**	**P-value**	**F crit**
Between Groups	575.1173708	2	287.5586854	0.107257182	0.898977317	3.682320344
Within Groups	40215.30497	15	2681.020331			
Total	40790.42234	17				

In the ANOVA Table 6-9 above, the test statistics F (2, 15) is 0.1073 and p>0.001 (p=0.90). This shows that there is no strong evidence that there are significant differences in the means of days receivables across the three groups at 5% level of significance. Investigating further, 3-pairwise comparisons among the regimes reveal that all three regimes failed to improve the days receivables as shown in the t-Test Tables 6-10, 6-11 and 6-12.

Table 6-10 t-Test: Paired Two Sample for Means

	GWSC	*GWCL*
Mean	203.4343814	208.8675478
Variance	2419.793118	3951.596112
Observations	6	6
Pearson Correlation	-0.138181301	
Hypothesized Mean Difference	0	
df	5	
t Stat	-0.156559872	
P(T<=t) one-tail	0.440858465	
t Critical one-tail	2.015048372	
P(T<=t) two-tail	0.881716929	
t Critical two-tail	2.570581835	

Column1	
Mean	-5.433166341
Standard Error	34.70344135
Median	-32.65193091
Mode	#N/A
Standard Deviation	85.00572363
Sample Variance	7225.97305
Kurtosis	-1.133226917
Skewness	0.489931858
Range	224.0453782
Minimum	-110.7693699
Maximum	113.2760083
Sum	-32.59899804
Count	6

Confidence Level(95.0%)	89.20803594

Using the paired test between GWSC and GWCL to determine whether or not GWCL took shorter periods in collecting its revenue than GWSC, the result shows that mean days receivable (M = 5.43, S.D = 85.01, N = 6) was insignificantly greater than zero, t (5) = -0.16, two tail p = 0.88, providing the evidence that GWCL failed to improve the days receivables between 1999 and 2006. A 95% confidence interval about mean improvement in days receivables is (83.78, 94.64).

Table 6-11 t-Test: Paired Two Sample for Means

	GWSC	*AVRL*
Mean	203.4343814	217.1800113
Variance	2419.793118	1671.671763
Observations	6	6
Pearson Correlation	0.884107855	
Hypothesized Mean Difference	0	
df	5	
t Stat	-1.455463684	
P(T<=t) one-tail	0.102652933	
t Critical one-tail	2.015048372	
P(T<=t) two-tail	0.205305865	
t Critical two-tail	2.570581835	

Column1	
Mean	-13.74562984
Standard Error	9.444158577
Median	-10.09331032
Mode	#N/A
Standard Deviation	23.13336956
Sample Variance	535.1527874
Kurtosis	-1.727639385
Skewness	-0.379736477
Range	56.13616515
Minimum	-44.77572419
Maximum	11.36044096

Sum	-82.47377901
Count	6
Confidence Level(95.0%)	24.27698248

Using the paired test between GWSC and AVRL to determine whether or not AVRL took shorter periods in collecting its revenue than GWSC, the result shows that mean days receivable (M = 13.18, S.D = 23.13, N = 6) was insignificant, t (5) = -1.46, two tail p = 0.21, providing the evidence that AVRL failed to reduce the number of days it took to collect its revenues than GWSC between 2006 and 2011. A 95% confidence interval about mean improvement in days receivables is (10.53, 38.02). Also, between GWCL and AVRL the result shows that mean days receivable (M = 8.31, S.D = 71.27, N = 6) was insignificant, t (5) = -0.29, two tail p = 0.79, providing the evidence that AVRL failed to reduce the number of days it took to collect its revenues than GWCL between 2006 and 2011. A 95% confidence interval about mean improvement in days receivables is (83.10, 66.48).

Table 6-12 t-Test: Paired Two Sample for Means

	GWCL	*AVRL*
Mean	208.8675478	217.1800113
Variance	3951.596112	1671.671763
Observations	6	6
Pearson Correlation	0.105930271	
Hypothesized Mean Difference	0	
df	5	
t Stat	-0.285710988	
P(T<=t) one-tail	0.393278867	
t Critical one-tail	2.015048372	
P(T<=t) two-tail	0.786557735	
t Critical two-tail	2.570581835	

Column1	
Mean	-8.312463495
Standard Error	29.09395801
Median	3.34615016
Mode	#N/A
Standard Deviation	71.26535172
Sample Variance	5078.750355
Kurtosis	-0.19993061
Skewness	0.043130089
Range	201.5674289
Minimum	-105.1418658
Maximum	96.42556308
Sum	-49.87478097
Count	6
Confidence Level (95.0%)	74.78839995

Further probing has revealed that delays in the payment of bills by Government greatly accounted for the high days receivable ratios. Sometimes, it took Government more than a year to pay bills of MDAs. For instance, bills of 2005 were paid in 2006 leading to a bill collection efficiency over 100% in 2006.

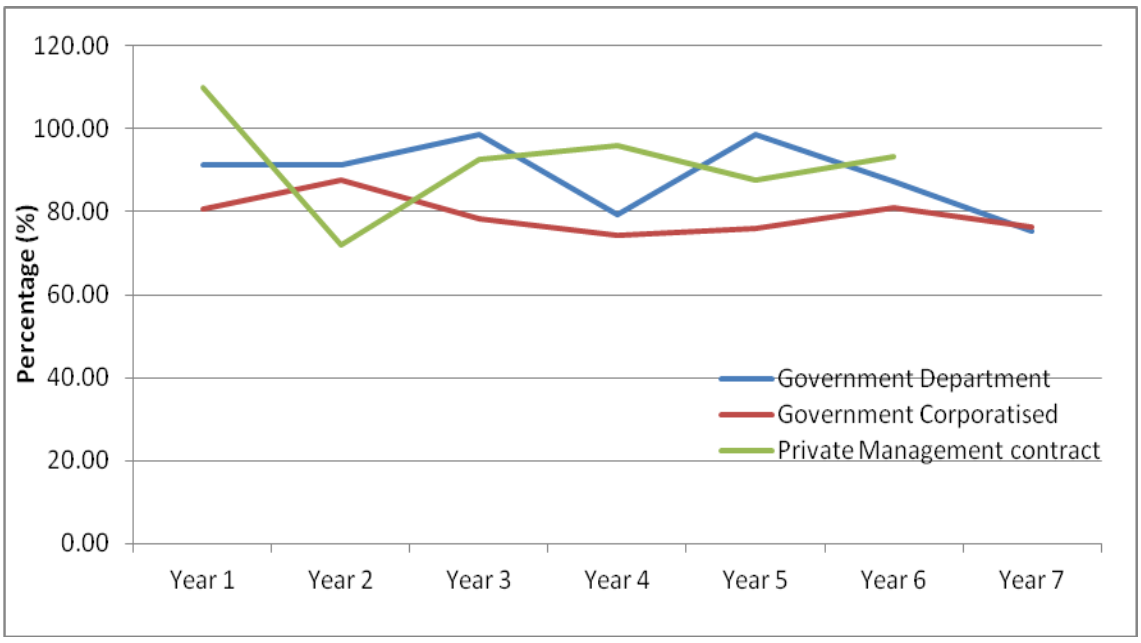


Figure 6-4 Bill collection efficiency comparison

Table 6-13 ANOVA output for bill collection efficiency

Groups	*Count*	*Sum*	*Average*	*Variance*
GWSC	**6**	530.3776631	88.39627719	93.5310051
GWCL	**6**	473.6343205	78.93905341	23.61507519
AVRL	6	551.7662166	91.9610361	150.6207207

Source of variance	**SS**	**df**	**MS**	**F**	**P-value**	**F crit**
Between Groups	543.4372414	2	271.7186207	3.044275313	0.77684424	3.682320344
Within Groups	1338.834005	15	89.25560034			
Total	1882.271246	17				

In the ANOVA Table 6-13 above, the test statistics F (2, 15) is 3.04 and p>0.001 (p=0.78) showing that there is no strong evidence that there are significant differences in the means of bill collection efficiency across the three groups at 5% level of significance. Further investigation conducted using 3-pairwise comparisons among the three regimes as shown in the t-Test Tables 6-14, 6-15 and 6-16 also reveal that all three regimes woefully failed to increase bill collection efficiency

Table 6-14 t-Test: Paired Two Sample for Means

	GWSC	*GWCL*
Mean	88.39627719	78.93905341
Variance	93.5310051	23.61507519
Observations	6	6
Pearson Correlation	0.268925569	
Hypothesized Mean Difference	0	
df	5	
t Stat	2.416884234	
P(T<=t) one-tail	0.030174491	
t Critical one-tail	2.015048372	
P(T<=t) two-tail	0.060348982	
t Critical two-tail	2.570581835	

Column1	
Mean	9.457223777
Standard Error	3.912981699
Median	5.655129606
Mode	#N/A
Standard Deviation	9.584808535
Sample Variance	91.86855465
Kurtosis	-1.607586711
Skewness	0.701049421
Range	23.42169017
Minimum	-0.878782842
Maximum	22.54290733
Sum	56.74334266
Count	6
Confidence Level (95.0%)	10.05863967

Using the paired test between GWSC and GWCL to determine whether or not GWCL was more efficient in collecting its bill than GWSC, the result shows that mean bill collection efficiency (M = 9.46, S.D = 9.59, N = 6) was significantly greater than zero, t (5) = 2.42, two tail p = 0.0604, providing the evidence that bill collection marginally worsened when the public water utility became a limited liability company between 1999 and 2006. A 95% confidence interval about mean improvement in bill collection efficiency is (0.60, 19.52).

Now, between GWSC and AVRL the result shows that mean bill collection efficiency (M = 3.57%, S.D = 17.20, N = 6) was insignificantly greater than zero, t (5) = -0.51, two tail p = 0.63, providing the evidence that there was no significant difference between the bill collection efficiency of GWSC and that of AVRL. A 95% confidence interval about mean improvement in bill collection efficiency is (14.49, 21.62).

Table 6-15 t-Test: Paired Two Sample for Means

	GWSC	*AVRL*
Mean	88.39627719	91.9610361
Variance	93.5310051	150.6207207
Observations	6	6
Pearson Correlation	-0.217994435	
Hypothesized Mean Difference	0	
df	5	
t Stat	-0.507613697	
P(T<=t) one-tail	0.316658212	
t Critical one-tail	2.015048372	
P(T<=t) two-tail	0.633316423	
t Critical two-tail	2.570581835	

Column1	
Mean	-3.564758907
Standard Error	7.022582189
Median	-6.899724507
Mode	#N/A
Standard Deviation	17.20174304
Sample Variance	295.8999636
Kurtosis	1.082296103
Skewness	1.175053125
Range	45.06497981
Minimum	-18.61602385
Maximum	26.44895597
Sum	-21.38855344
Count	6
Confidence Level (95.0%)	18.05212221

Table 6-16 t-Test: Paired Two Sample for Means

	GWCL	*AVRL*
Mean	78.93905341	91.9610361
Variance	23.61507519	150.6207207
Observations	6	6
Pearson Correlation	0.48252224	
Hypothesized Mean Difference	0	
df	5	
t Stat	-2.952931467	
P(T<=t) one-tail	0.015888731	
t Critical one-tail	2.015048372	
P(T<=t) two-tail	0.031777463	
t Critical two-tail	2.570581835	

Column1	
Mean	-13.02198268
Standard Error	4.409849274
Median	-17.69199209
Mode	#N/A
Standard Deviation	10.80188056
Sample Variance	116.6806237
Kurtosis	1.392284105
Skewness	1.439277477
Range	28.36485575
Minimum	-22.15044129
Maximum	6.214414452
Sum	-78.1318961
Count	6
Confidence Level (95.0%)	11.33587844

Finally, the improvement AVRL made in bill collection efficiency is shown in Table 6-16 above. The test shows mean improvement in bill collection efficiency (M = 13.02%, S.D = 10.80, N = 6) was significantly greater than zero, t (5) = -2.95, two tail p = 0.032, providing the evidence that there was significant improvement in bill collection efficiency during the period of private operator (AVRL). A 95% confidence interval about mean improvement in bill collection efficiency is (1.69, 24.38). Overall, the average bill collection efficiency increased by 13% during the period of AVRL.

6.1.4 Staffing levels

Staff per 1,000 persons served obviates all distortions associated with cases of one single point serving several households. It is evident that overstaffing predated the era of GWC*L*.

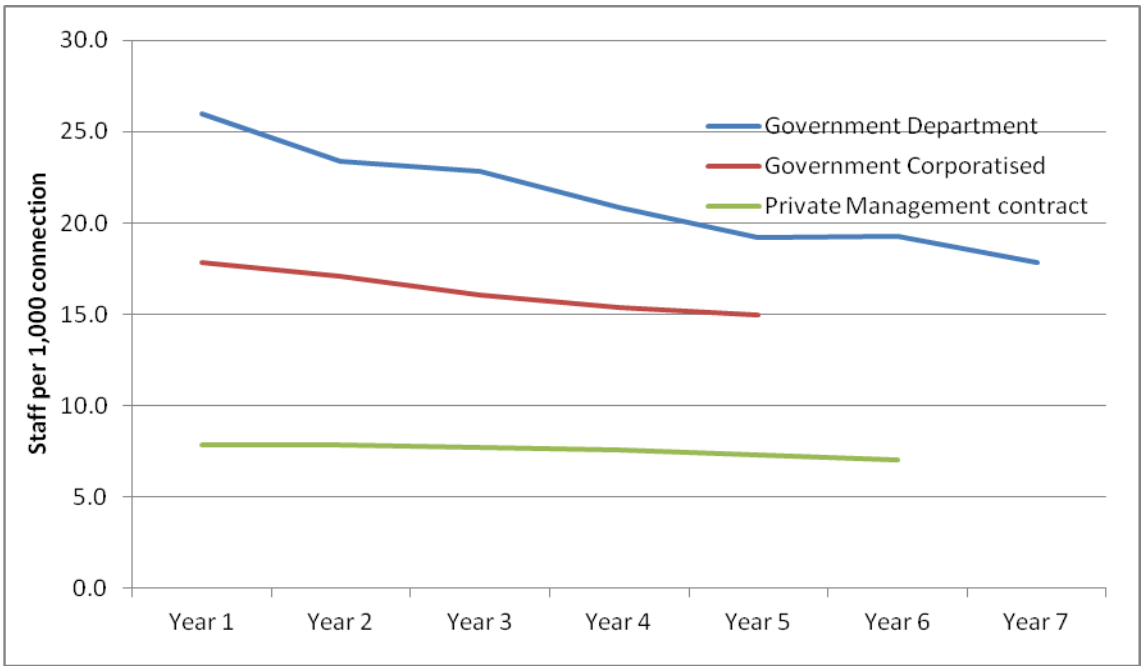


Figure 6-5 Staffing levels comparison

There were 65 staff per 1,000 connections in 1968 but had since declined through system expansions and reforms over the years. As depicted in the figure 6-5 above, the assertion that there is excess labour in the water sector in developing countries was confirmed by the Ghanaian situation. Here, staffing levels marginally improved

under the management of the private operator. Overstaffing greatly rocked the water utility under GWSC as a result of institutionalised political patronage, tribalism, cronyism and nepotism which still exist presently in Ghanaian .

Apparently, labour productivity significantly improved from 26 staff per 1,000 connections in 1991 to 18 staff per 1,000 connections in 1998 and further improved to 15 staff per 1,000 connections in 2003. Labour productivity improved year after year from 18 staff per 1,000 connections in 1999 to 8 staff per 1,000 connections in 2006 when AVRL took over from GWCL. With the increases in staff numbers and the corresponding increases in customer strengths during the 5-year period of AVRL, staff per 1,000 connections improved from 8 in 2006 to 7 in 2011.

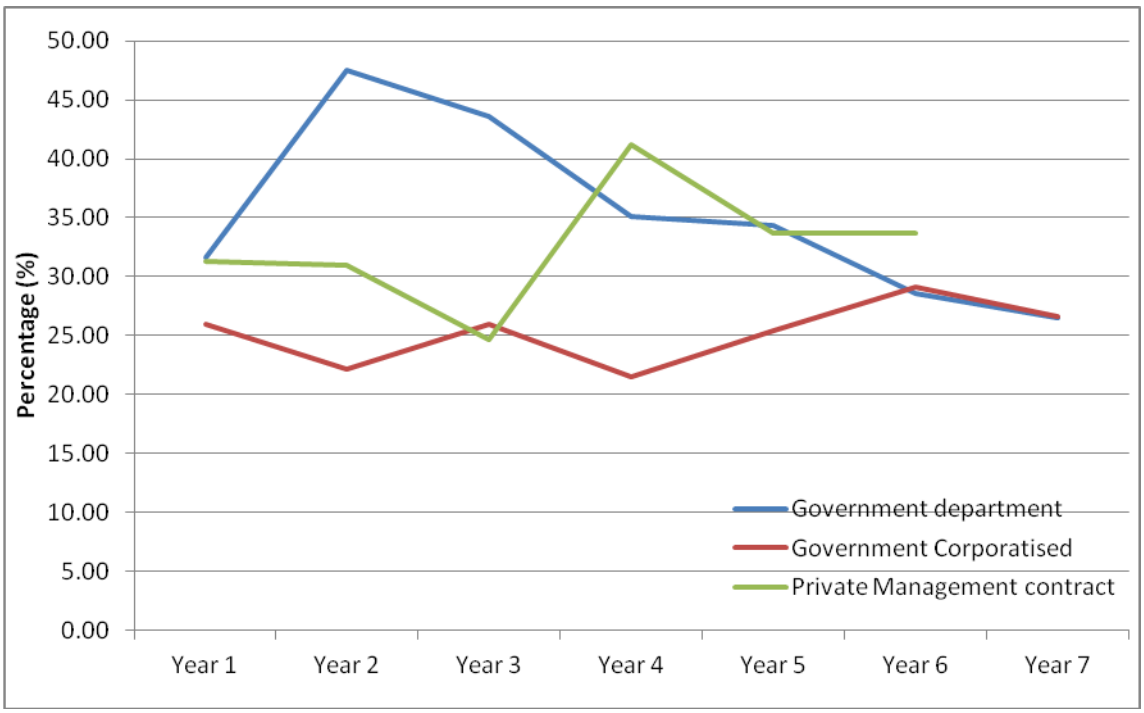


Figure 6-6 Personnel costs per total operating costs comparison

Generally, the water utility was poorly run through loose employment practices, political patronage, tribalism, nepotism and cronyism leading to overstaffing. GWCL had the lowest (i.e. less than 30%) personnel costs per total operating costs with the highest under GWSC over 47%. However, the per capita personnel costs calculated as a share of total operating costs were highest under AVRL.

6.1.5 Financial ratios

Ensuring an efficient billing posed major challenges to all regimes to the extent that billings were done based on guesstimates due to low metering and illegal connections. Bill collection efficiency was fairly high from 1991 until it dropped to 79.4% in 1995. It however improved significantly in 1996 and worsened again till GWCL took over in 1999. Nevertheless, GWCL performed poorly in its bill collection functions. Bill collection efficiency under AVRL was fairly high with GWCL recording the worst or lowest collection efficiencies among the three service entities. Generally, days receivables ratios were high in all cases partly due to long delays in the payment of bills of government entities.

6.1.6 Operating ratio

High operating ratios were recorded during the three regimes making it impossible for the water utility to take care of its non-operating expenditures. Electricity and Chemical costs constitute the two major cost components of the production costs. Averagely, electricity and chemical costs constituted 51% and 18% of the total cost of production respectively under the AVRL while that of GWCL were 45.9% and 16.7% respectively. Personnel costs also increased significantly under AVRL and this may explain the large negative net margins recorded over the years. Evidently, AVRL failed to reduce both chemical and electricity costs also as stipulated in the agreement.

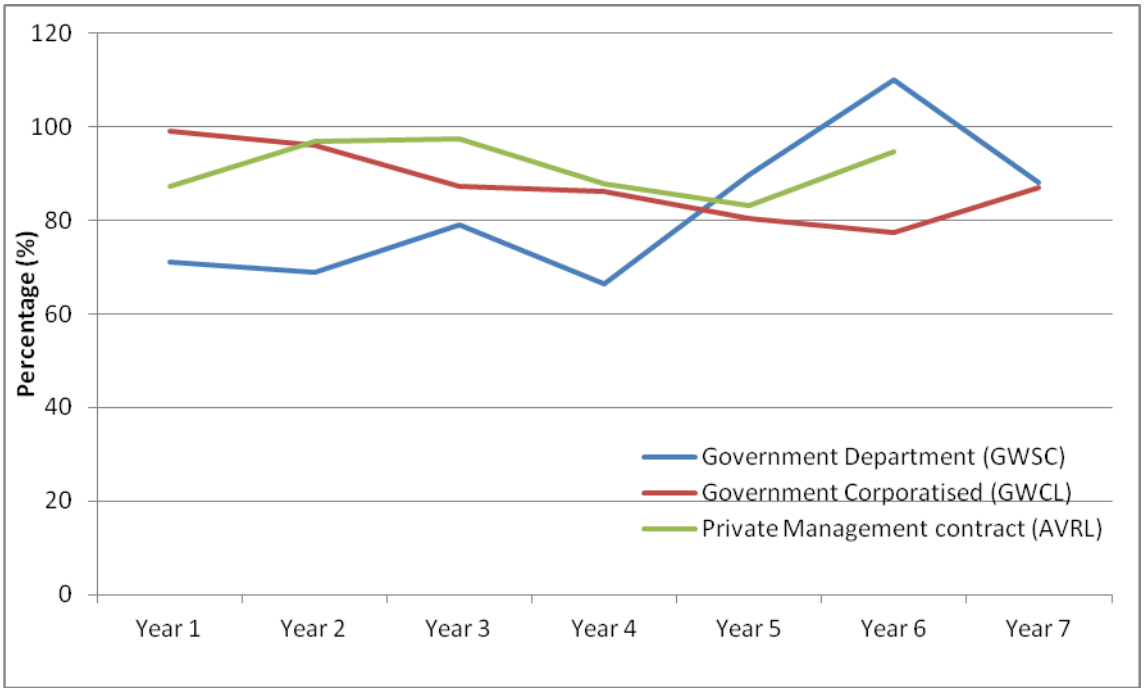


Figure 6-7 Operating ratio comparison

Chemical and electricity costs constituted two major cost components of the total operating expenditure that significantly affected the operating ratios of all three service entities. Therefore, any attempt to reduce these costs would automatically improve the operating costs of the utility. Now, while GWSC operated with the minimum operating ratio of 66.3% in 1995 and the maximum of 205% in 1985, GWCL operated between 77% and 99% in 2004 and 1999 respectively. Albeit AVRL the reduction of chemical and electricity costs was stipulated in the agreement; it failed to reduce the hence operating with ratios ranging between 83% and 98% which were unacceptable.

6.1.7 Liquidity

The liquidity positions of all three regimes were bad with a lot of funds tied up in cash as a result of high receivables. Usually, inflation, exchange rates and losses have always been used by both the regulator and the water utility to justify for tariffs increases. It is however intriguing to observe that current ratio sharply declined from 2.02 in 2005 to 0.96 in 2006 and further worsened to 0.75 in 2011. For the two decades, the utility failed to gain financial independence and always struggled to repay its foreign loans and pay for its imports.

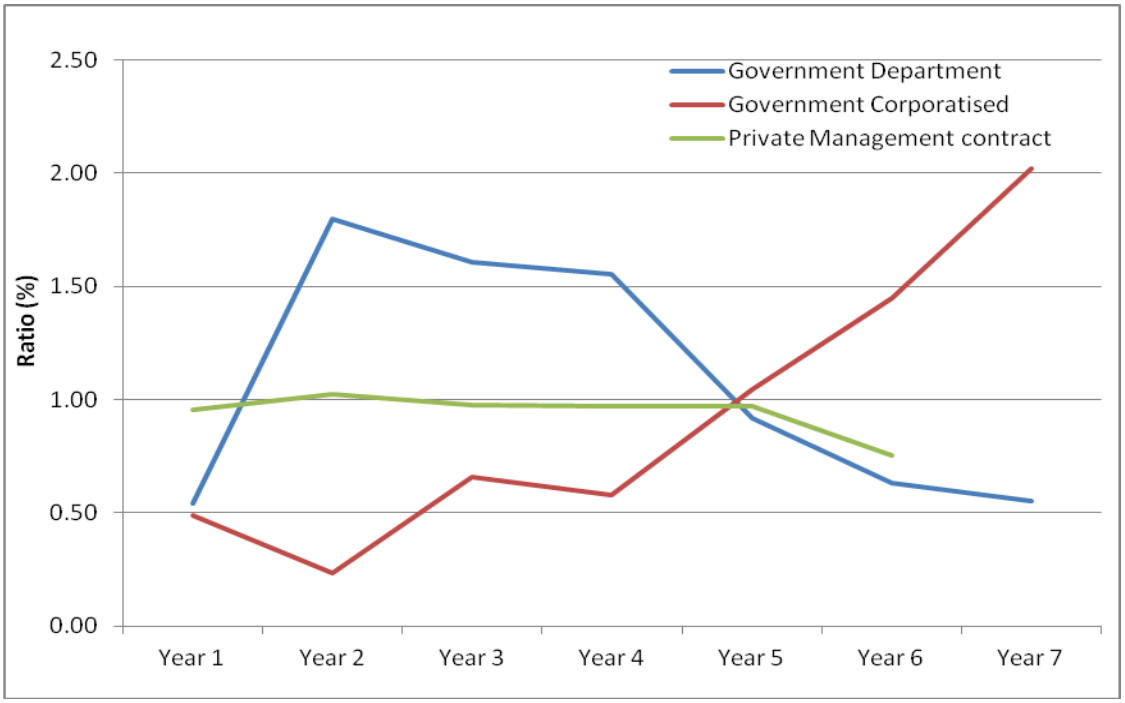


Figure 6-8 Current ratio comparison

From 1984 to 1998, the short-term solvency of GWCL could best be described as extremely low except in 1988 when it had a current ratio of 2.52. Albeit the liquidity position was bad initially under GWCL, it significantly improved after 2003 till AVRL took over in 2006. The liquidity position of AVRL was very low. AVRL achieved the best current ratio of 1.03 during the five years in 2007.

6.1.8 Profitability

For lack of data in 1992 and 1993, the utility's profitability could only be assessed after 1993. Nonetheless, from 1994 to 1998, GWSC recorded deficits with the explanation that, in the case of 1994 with a ROFA of 9.69%, the utility's assets were overvalued by 800 percent in the year. For three consecutive years prior to the Management contract, GWCL made positive returns on its fixed assets. AVRL recorded marginal profits with losses in 2007 and 2008.

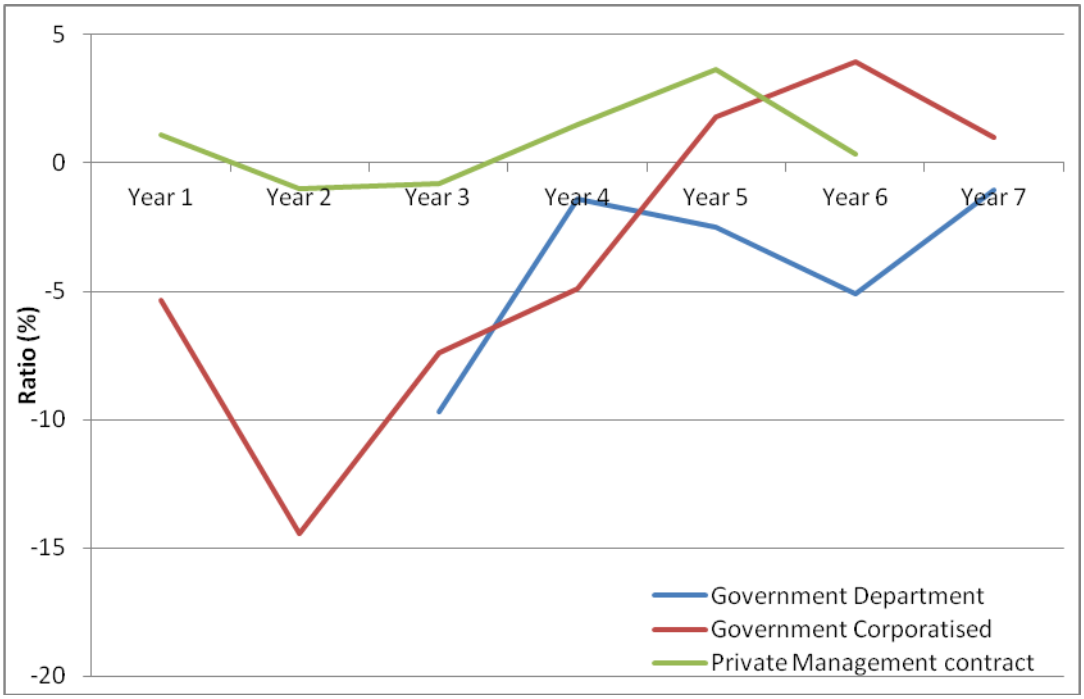


Figure 6-9 Profitability ratio – ROFA comparison

From 1994 to 1998, GWSC failed to make returns on its fixed assets and therefore recorded deficits throughout the period. GWCL and AVRL also failed to reduce their operating ratios, non-revenue water and increase their bill collection efficiencies, and thus posed a serious challenge to the utility's profitability at any given time.

6.1.9 Creditworthiness

The utility's debt to equity ratio was very high under GWCL indicating that majority of the water utility's assets from 1999 to 2003 were financed through debts. The utility's creditworthiness during this period could therefore be described as very low forcing government to engage private hands in 2006. It is however worthy to note that the debt to equity ratios began to exceed 100% two years before GWSC was converted into a limited liability company in 1999.

Clearly, the utility's leverage significantly improved under the private operator with 12.54% at the end of the contract. Majority of the utility's assets were financed through debts during the three regimes. For instance, the debt to equity ratios of GWSC exceeded 100% in 1997 and 1998 while in 2001, the ratio was 312.87%. The long-term

debt to shareholder's equity improved during the period of AVRL with a ratio of 12.54% in 2011.

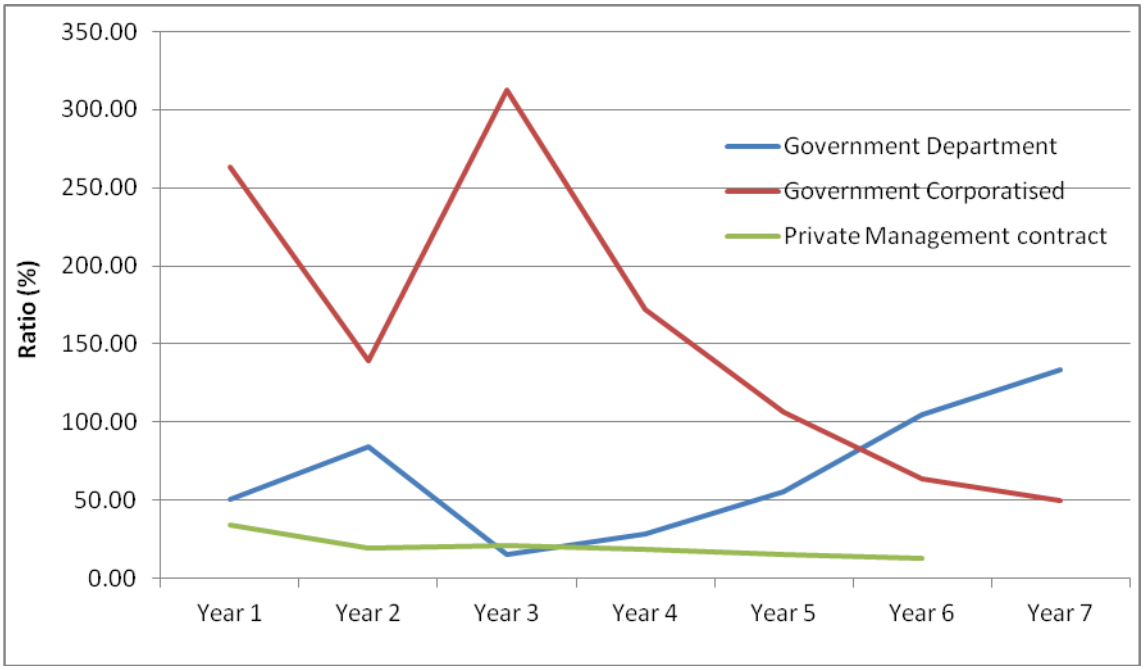
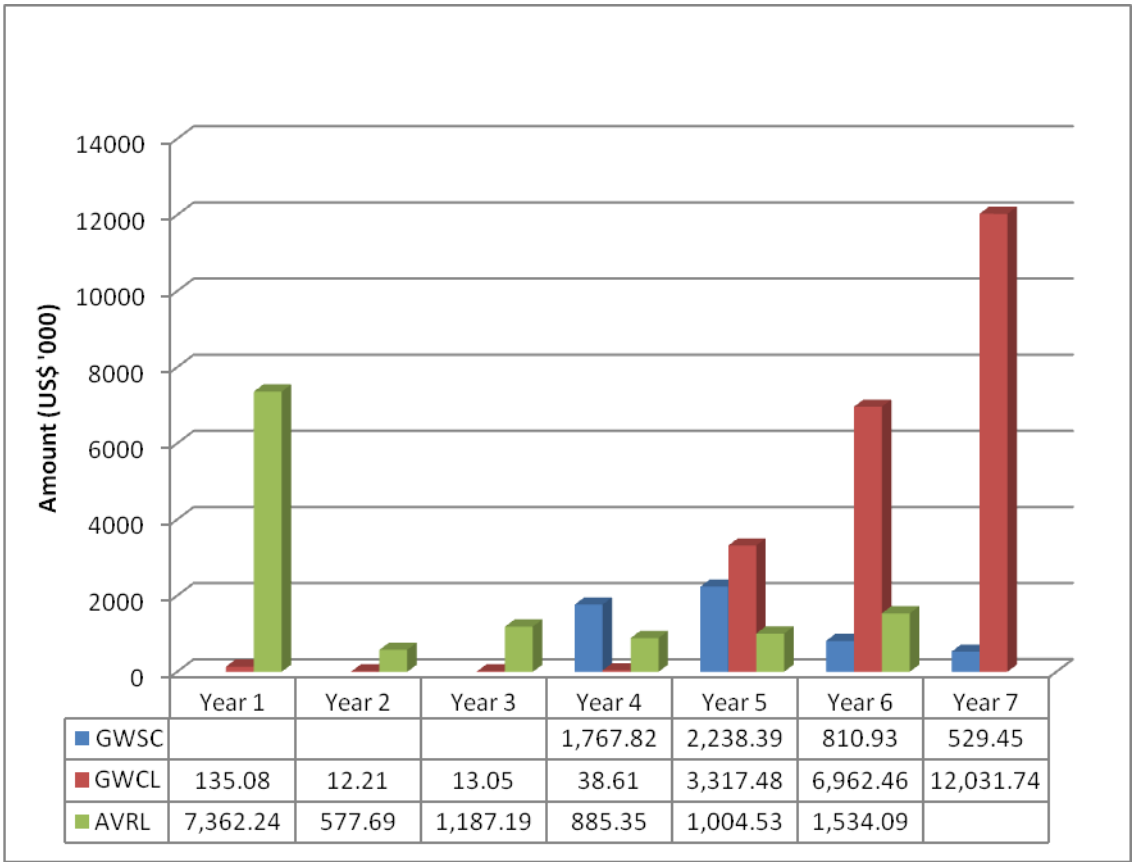


Figure 6-10 Leverage ratio comparison

6.1.10 Investment levels

Generally, investment has been both slow and low in the urban water supply sector in Ghana. Evidently, from the figure below, investment in the sector continued to lag behind the urban population. For lack of data on investment from 1992 to 1994, only four years was employed for GWSC. However, investments from 1995 to 2002 were very low until 2003 when investment seemed to begin again until 2006. From 2007, not much investment could be said to be done in the sector. The author may therefore attempt to speculate by asking whether the chunk of the funds voted for the management contract truly went into infrastructural development or not since very little could be seen to done after 2007?



	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
GWSC				1,767.82	2,238.39	810.93	529.45
GWCL	135.08	12.21	13.05	38.61	3,317.48	6,962.46	12,031.74
AVRL	7,362.24	577.69	1,187.19	885.35	1,004.53	1,534.09	

Figure 6-11Investment comparison (all in 2011 prices)

In most cases, it is observed that performances of the three regimes improved in their last years of operation. Perhaps, these performances were exhibited to justify management's inclusion in subsequent arrangements.

Even though some investments were undertaken during the three regimes, it was evident that investments had not been systematic and consistent. Secondly, since the utility was not capable of financing its own capital projects. However, it is worth noting that AVRL was limited by the arrangement in terms of the body that controls funds for investment.

6.1.11 Public demonstrations against the Operator

Prior to the engagement of the private operator, civil society groups, opinion leaders and opposition parties opposed the policy of engaging a private operator and stated publicly that Ghanaians are equally capable and competent enough to manage the public water utility. Somewhat, a point must also be made that the process of engaging the private operator was one major source of public agitation. This is because the reform process was not consultative enough. Not only that but also, many people who hate to hear of policy stance of the World Bank, multilateral and bilateral donors on public utility services opposed the decision vehemently because, they believed it was at the behest of the World Bank. Unfortunately for the private operator, the biggest opposition party, the National Democratic Congress that also fiercely opposed the contract won the 2008 national elections. His Excellency Professor John Evans Atta Mills at a presidential debate leading to the 2008 presidential elections registered his opposition to privatisation. This also made the renewal of the contract very uncertain – that is, if they were going to allow the 5 years to elapse at all. It therefore made it difficult for his government that came into power in January, 2009 to show the needed commitment towards the arrangement but to wait patiently for the contract to end in June, 2011. Overall, arrangement therefore suffered institutionally, culturally and politically.

Administratively, a power struggle between the private operator and the grantor (the erstwhile GWCL) was inevitable and evident considering the oversight responsibility of the Grantor. As indicated in an earlier chapter, procurement of materials sometimes were unduly delayed even though a senior officer at the Grantor denied the Grantor's responsibility for the delay and said during the interview that *"they know the procurement laws of Ghana and if they failed to begin the process in good time, we cannot be blamed for it".* Again, the engagement of private operator was considered as a threat to the "*old order",* undermining and disgraceful to some staff of the erstwhile utility that saved as staff of the Grantor.

Apparently, some who opposed the arrangement did so for fear of high tariffs that are usually associated with privatisation. However, for several years, some Ghanaians took advantage of the inefficiencies that had engulfed the public water utility including lack of attention for massive illegal connections and non-payment of bills for months and years.

Figure 6-12 Demonstrating against AVRL Source: Adam, (2011)

It is therefore worth mentioning that the opposition by some Ghanaians to the arrangement were merely selfish. Not only that but also, some seconded-staff from GWCL to AVRL did not support the arrangement since they were disempowered financially and administratively. Placards displayed in the photo above vividly confirmed the level and forms of agitations employed against the private operator.

7 Discussion of Results

This chapter highlights the implications of this research for all urban water supply sector players in terms of policy and practice. It presents major limitations of the research pondering over other ways of undertaking the research that could have been employed in order to achieve the objectives of this research in a typical African setting. Lastly, further research implications are highlighted.

7.1 Conclusion about the research proposition

Considering the proposition underlying the study, stating that:

"A management contract does not provide the necessary level of empowerment, incentives, commitment and access to resources for a private operator to adequately and efficiently perform, even where there is an established economic regulator with a clear mandate"

the researcher somewhat finds the above statement to be true for the management contract between GWCL and AVRL to the extent that major decisions could only be taken in consultation with the Grantor whose staff had vested interests and some politically appointed. For instance, tariff increases were sometimes delayed for several months or not approved by the regulator due to political reasons. Procedurally, the private operator was also frustrated by the Grantor through procurement processes by deliberately delaying the procurement of certain items. Not only that but also, the contract failed to set clear performance targets. For instance, its baseline data was doubtful and contested by the private operator leading to unnecessary delays in agreeing on the SNAG items identified by the private operator.

Finally, the political capital made out of the arrangement prior to the engagement by the then main opposition party - the National Democratic Congress, made it difficult for the National Democratic Congress government to show total commitment and support for the management contract while in power. In view of the facts above, the proposition could be said to contain at least a valid level of foresight even if it has not subsequently been provable beyond reasonable doubt by the data available.

7.2 Status of the water sector

For every country and region, safe and efficient water supply is a challenge. Albeit governments, private sector and water utilities around the world continue to inject substantial amount of resources into the sector, technical, technological, financial, environmental, managerial, socio-cultural and political challenges still abound - a situation that calls for more systematic, aggressive and deliberate efforts towards addressing the challenges. According to Nield (2011), as cited in IBNET, (2014), water service coverage from a protected source is practically non-existent in newly established countries including South Sudan. Intriguingly, in more advanced countries such as the United States of America, approximately 177 million of its citizens access water from sources that lack adequate protection. Essentially, all reports on water supply management identify lack of proper maintenance, negative effects of "reduced" maintenance practices, challenge of reducing high electricity and chemical costs and high unaccounted-for water or high non-revenue water. Additionally, late and non-payments of bills by customers are major challenges for water managers in most low-income countries leading to high days receivable figures and loss of revenue. On the one hand, while water utilities complain about low water tariff levels, consumers cry against tariff increases on the other hand irrespective of prevailing tariff levels.

Data collected on more than 4,400 utilities from 135 countries by the International Benchmarking Network for Water and Sanitation Utilities in December, 2013 which was intensively analysed and assessed for the period, 2006 to 2011 reports of similar challenges mentioned above. According to IBNET, (2014), water coverage declined in both low and middle-income countries. The decline was however recorded more in the low-income countries. It also revealed that the share of utilities that could not cover their basic Operation and Maintenance (O&M) costs increased from 34% in 2000 to 37% in 2010 - challenges that the urban water supply utility in Ghana continues to grapple with over three decades. Meanwhile, the share of utilities that could not cover their O&M costs increased from an average of 28 percent in 2000 to 50 percent in 2010 and occurred more in low-income countries. Furthermore, non-revenue water improved from 31% in 2000 to 27% in 2011 with the highest non-revenue water figures recorded in low-income countries and the lowest non-revenue water figures in high-income countries.

Table 7.1 Performance indicators of water supply services, 20006- 2011

INDICTOR/YEAR	**2000**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011** *Prelim*
Number of utilities reporting on Non-Revenue Water	***589***	***1,242***	***1,448***	***1,349***	***1,403***	***1,488***	***1,253***
Median Non-revenue water (%)	31	26	31	29	29	28	27
Average nonrevenue water (%)	32	33	32	31	31	31	30
Number of utilities reporting on staff productivity	***598***	***1,421***	***888***	***1,440***	***1,679***	***1,803***	***1,574***
Median staff productivity	1.36	1.06	1.21	1.00	1.00	0.99	1.00
Average staff productivity	2.02	1.37	1.51	1.28	1.26	1.29	1.29
Number of utilities reporting on collection period	***594***	***1,437***	***1,521***	***1,476***	***1,600***	***1,633***	***1,383***
Median collection period (days)	154	96	87	82	76	70	66
Average collection period (days)	233	157	142	139	125	116	121
Number of utilities reporting on water coverage	***630***	***1,454***	***1,534***	***1,507***	***1,725***	***1,686***	***1,453***
Median water coverage (%)	82	92	92	92	90	88	89
Average water coverage (%)	77	84	83	83	81	81	80

Source: IBNET (2014) *Note:* Prelim represents preliminary

Comparatively, Ghana's non-revenue water figures are far higher than the global averages as shown in table 7.1 and marginally improved from 51.35% in 2000 to 49.22% in 2011. Both electricity and chemical costs increased from 18% and 13% in 2000 respectively to 56% and 15% in 2011 respectively leading to high operating costs and the utility's inability the cover its O&M costs. Apparently, staff productivity improved from 9 employees per 1,000 connections in 2000 to 7 employees in 2010 and varied

widely from about 11 employees per 1,000 connections in low-income countries to slightly more than 3 in upper middle-income countries partially as a result of connection practices (IBNET, 2014). Progressively staff productivity improved from 17 staff per 1,000 connections in 2000 to 7 in 2011 in the case of Ghana. As shown in the table 7.1, while days receivables improved from 154 days in 2000 to 70 days in 2010 and therefore achieving the commonly used benchmark of a 90-day collection, it worsened from 180 days in 2000 to 213 days in 2011.

Universally, this research closely corroborates the findings in the 2014 report of the International Benchmark Network for Water and Sanitation Utilities which reveals that low-income countries still need to more in the water sector by way of injecting more resources, efficiency, effectiveness and managerial competences into the urban water supply sector.

7.3 Research limitations

Seldom would writers explicitly exhaust various ways or strategies of describing every challenge that researchers face during data collection. In these books, albeit challenges faced by researchers during data collection are mentioned authors do not necessarily prescribe specific remedies to all since every research environment has its own peculiar challenge(s) and remedies. It is in this vein that the researcher's experience during data collection in Ghana is worth recounting in this report. The rich experience gathered by the researcher during data collection in Ghana could serve as a guide to other fellow researchers who might want to undertake similar activities in Ghana and in some other countries in Africa in future most especially foreigners.

Prior to the researcher's departure from the United Kingdom to Ghana for data collection, he ensured that all necessary arrangements were made with eligible institutions and individuals through telephone calls, emails. In addition, application letters were submitted on arrival to ensure that permission to collect information from the institutions and individuals was sought before embarking on data collection activities in all the eligible organisations. This was done to avoid earlier challenges the researcher encountered during the first fieldwork in 2008, taking into consideration the usual bureaucratic processes that exist in the Ghanaian public service. On arrival, further consultations were undertaken to explain to some of the principal officers of the water utility what the research was seeking to do and where dates were fixed for the

visits. However, on the first day of the visit, it became very evident that more had to be done in order to access any relevant information that was required since it was difficult to meet with any of the officers except one. All efforts made to meet the officers proved futile in the beginning. Reasons assigned for their inability to honour these meetings were that they were attending meetings and workshops while some did not come to the office at all.

This challenge or frustration persisted for weeks until one day the researcher met one of the staff who then assisted him to meet with the officers and asked them to help him with the information he needed. Afterwards, the researcher was advised to submit a letter to seek permission and approval from the Managing Director of GWCL to undertake the research activity. On one of the researcher's usual unfruitful visits to the water company, a staff said to him

"gentleman, you will not be able to do anything here if you continue to wait for the approval of your request letter before commencing your data collection, this letter will not come today or tomorrow, forget about it, go ahead and do what you want to do".

At the time of doing this report, the researcher's letter had still not been acknowledged by the Managing Director by either writing or word of mouth. The advice given by the staff served as an eye-opener to the researcher leading to the adaptation of alternative but "unorthodox" strategies of collecting data from all the stakeholders in Ghana which proved very effective – a method that are not explicitly stated in the books researchers read. In short, different research environments will pose different challenges during data collection and can only be overcome when the researcher knows and understands the strategy or methods that best suits the environment.

In spite of all the necessary initial contacts and arrangements made with the eligible institutions and individuals through visits, telephone calls, and letters and confirming dates of visits, almost everything had to be rescheduled making planning very difficult and data collection very costly. For instance, the driving distances from the researcher's home base in Tamale to Accra is 660 kilometers and from Accra to Kumasi 270 kilometers, and required travelling hours of approximately 12 and 5 hours respectively. In summary, data collection in Ghana had been a tedious task fraught with a lot of bureaucratic and cultural challenges. Lack of time consciousness and unnecessary bureaucratic processes were identified as major challenges that

affected the smooth collection of data during the fieldwork. Meanwhile, further investigations revealed that the challenges were encountered as a result of:

- The political season in Ghana at the time of data collection which was unfavourable (i.e. the political party in government at the time of data collection, the National Democratic Congress opposed the management contract arrangement with AVRL while in opposition between 2001 and 2008)
- Fear of government using the researcher to investigate the performance of both the private operator and the grantor so as to abrogate the management contract with AVRL which at the time was lobbying or seeking for extension of its contract period.
- An on-going investigation of the water utility by Serious Fraud Office (SFO) at the time of data collection
- The usual attitude of most Ghanaian public/civil servants towards 'outsiders' seeking information about their jobs or organisations (lack of transparency)
- The uncertainty of government's position regarding the extension of the contract period after 2011.
- Agitation of some sections of the public against private sector participation in the urban water sector at the time of this investigation.

Nothing could be said to be predictable or certain in the urban water supply environment in Ghana regarding data gathering since there was a lot of suspicions on the part of both the grantor and the private operator at the time. The key limitation of this research therefore has been the difficulty in gaining access to the detailed performance information of both public and private companies. Access might have been more readily available if the researcher had been employed as a staff member within the utility but would then have been liable to bias in assessment of what would in effect have been researcher's own performance.

Finally, the study would have benefited from using more a sophisticated analysis approach to bring together the range of different performance indicators in to a single analysis or composite, either through a DEA type approach or through a ranking procedure.

7.5 implications for theory and contribution to knowledge

Uniquely, the research investigated and compared performances of three different regimes of management models in a single urban water supply system of Ghana

including a corporatised entity (GWSC), a limited liability company (GWCL) and a private operator (AVRL) over a 27-year span. Further, it assessed the suitability of the form of private participation and the net improvement the management contract brought to the urban population. The study confirmed the proposition that management contract would not be enough to make any significant difference. In addition, the study showed that the two previous reorganisations also failed to make any significant difference and thus provide a unique contribution to academic knowledge and understanding. This implies that the success or failure of the Ghana urban water supply system is independent of the management models employed as the performances of all three regimes showed no significant differences. Instead, it may be dependent upon other factors such as the competence of system Managers engaged, political will of governments, institutional culture, level of investments, quality of management contractor, leadership style and finally the attitude of consumers towards such reforms as in the case of Uganda.

7.6 Implications for further research

Since the start of this research it became clear that the possible role of private sector engagement in lower-income countries is no longer being promoted so actively by the international finance institutions and donors. There are other examples of management contracts being undertaken during this period, such as that of Suez Environment in Algiers, but they appear to be the exception. It appears therefore that further research into the role of the private sector and the capabilities, or otherwise, of the particular approach of management contracts is not required. However, the underlying challenge of delivering potable water to all urban consumers in a sustainable manner remains. The extent to which this can be facilitated, encouraged and achieved, by default ahead of the socio-economic development trend line (Franceys & Gerlach, 2010), is clearly an area deserving of further research. Also, further research is required to determine the extent to which managerial performance and the local environment of a water utility influence non-revenue water.

7.7 Implications for policy makers or government

According to (Marin, 2009), reforms in the water sector in the 1990s were badly necessitated by the sector's growing challenges. During this period, the reforms relied heavily on the private sector and since 1990, governments in developing and emerging countries have signed not less than 260 PPP contracts in the water sector. In spite of

the successes chalked in the water sector by the private sector, one thing that has remained uncertain and controversial is the suitability or unsuitability of the approach for developing countries as in the case of Ghana. But while it seems so difficult to inject the needed level of efficiency and effectiveness into the operations of many poorly performing public water utilities in low-income countries through PPP, others have succeeded in doing so. In the case of Ghana, the urban water utility has undergone various phases of reforms including the involvement of the private sector but failed to realise the fundamental objectives of those reforms. Generally, the research has revealed that political patronage and interference, corruption, nepotism, tribalism and poor management remain the stumbling blocks to the development and survival of the urban water utility. Another major challenge has been the inability of the regulator to periodically increase water tariffs due to political interference. It is crucial and significant to allow the PURC to periodically apply the automatic tariff adjustment formula so as to ensure that realistic tariffs are paid by consumers taking into account the pillars of sustainability (i.e. social, economic and environmental) and ensuring that the urban poor are adequately catered for through a deliberate policy. By creating a favourable environment, will attract increased public and private sector investments that will ultimately lead to system expansions. A major defect of the arrangement was the supervisory role that was assigned to the erstwhile GWCL (i.e. Asset Holding Authority) over the private operator. It was a complex and difficult task for staff of the grantor to perform because some of the senior officers of the erstwhile GWCL on secondment to AVRL could hardly be effectively monitored since they were previously their superiors. In addition, due to salary disparities between staff of the grantor and seconded staff of AVRL, relationship between the two entities was quite hostile which the researcher considers technically and administratively inappropriate. As indicated above, the relation between AVRL and the Grantor could not be described as cordial to the extent that the two parties could not agree on the operator's definition of customer response time over the five years of its operation. This therefore makes more significant for all key sector players in the urban water supply sector including system managers, policy makers, policy implementers, politicians and regulators understand the fundamental principles of good water governance which is crucial and critical in overcoming the major challenges in the urban water sector.

Furthermore, the gross failure of the contracting authority to gather sufficient and accurate baseline data to be able to set achievable performance targets for the private operator thus exposes the sloppy and unrealistic performance targets set in the

contract leading to a number of SNAG items that the operator took advantage of, coupled with poor supervision. In most cases, performance targets were either unrealistic or left open. Finally, the research has shown that issues of high non-revenue water, water rationing, low coverage, poor asset management, high operating ratio, bankruptcy, corruption, illegal connection, high unaccounted for water, low water tariffs and poor water governance can be addressed by either public or private operator provided the needed political will, investment and strong leadership are available. The results of this research elucidate the point that a management model works in the right environment and fails in the wrong environment provided the contract or arrangement is adequately designed, coordinated and implemented. This research attempts to create the needed awareness among policy makers and implementers and consumers regarding the herculean task that faces the urban water sector in Ghana.

8 Conclusions

The major conclusions of the research which are drawn from literature and results of the fieldwork conducted in Ghana are presented in this chapter including the research hypothesis, investigated objectives and problems.

8.1 Conclusions about the research problem

Ghana is endowed with so much water resources, yet many urban and rural dwellers continue to lack potable water especially people living in the urban slums. Governments have attempted to address these challenges through policy and institutional reforms such as capital injection, forgiveness of debts, establishment of a regulator, conversion of the public water utility from a corporatised institution into a limited liability company and the engagement of a private operator through a management contract, the woes of the utility will still not just go away. The urban water supply sector of Ghana has gone through series of reforms by way of its policies and management models since its inceptions all in the attempt to ensure efficiency, accountability, equity and sustainability. However, in the mist of these reforms lies a barrage of challenges including lack of transparency, lack of accountability, political interference and patronage and improper pricing of water.

These challenges called for a new management model that brought AVRL to manage the urban water utility for five years. Apparently, the challenges faced by Ghana's urban water utility are not too different from the challenges that confront most low-income or developing countries in the urban water supply sector except that their solutions could best be found within the environments in which they exist. The reason being that, same management models may produce different results in different jurisdictions depending on the nature of the contract, the political environment, the institutional framework, the legal framework, the regulatory framework, institutional culture, the operator and consumers among others.

Through a set of objectives, the research problem was addressed and some specific conclusions drawn. The objectives of this research were to;

- Investigate the context within which Ghana Water and Sewerage Corporation (GWSC), Ghana Water Company Limited (GWCL), Aqua Vitens Rand Limited (AVRL) and Public Utilities Regulatory Commission(PURC) operated in Ghana;
- Evaluate the performance of Ghana Water and Sewerage Corporation/Ghana Water Company Limited (Public utility) over the period preceding the management contract;
- Evaluate the performance of Aqua Vitens Rand Limited (management contract);
- Investigate the effectiveness of the Public Utility Regulatory Commission;
- Evaluate the level of empowerment, incentive, commitment and access to resources necessary for efficient service delivery by service providers.

The research therefore attempted to answer the following questions:

- To what extent have the activities of the economic regulator influenced the performance of GWCL or AVRL by way of ensuring that service delivery is efficient, effective and sustainable?
- How have national policies and institutional frameworks in the past influenced the service delivery of the public utility?
- What is the appropriate set of evaluation indicators for public and privatised water utility and could there be a new way of assessing or evaluating the performance of the urban water utility under the present management contract in Ghana?
- How could data be effectively generated to populate the performance indicators for analysis?
- What aspects of, and possibly to what extent, the management contract have empowered or conflicted with the organisational behaviour of service provision?

With respect to the context, it is apparent that the development of an economic regulator has been well received by consumers and informed participants as a good thing in principle. Largely due to political interference, the regulator somewhat failed to perform some of its roles fairly, effectively and efficiently. The regulator failed to adhere to some of the regulatory principles and exhibits its weaknesses in the area of transparency, consistency, independence and water supply services for the urban poor. Even though the existing regulatory framework is acceptable to all stakeholders, it is said that the regulator must be seen to be exhibiting more transparency and independence in its operations. It was therefore generally suggested that the way

forward is by financing its budget through a regulatory fee that is imposed on utilities that it regulates rather than depending on the central government for funding thereby compromising its independence. The overall approach of national policies and the varying institutional frameworks appear to have addressed appropriate issues in principle with little benefit in practice. A point could be made that the split in responsibility between asset ownership and asset management was a political compromise with regard to institutional frameworks that delivered a compromise in performance – but there is no evidence to prove this point. In addition, there is no evidence to suggest that it has made any significant difference to either the performance or financial viability of the two different management models associated with its existence since 1999.

The urban water supply system has gone through various developmental phases in the attempt to extend water supply services to all. Though erratic, it helped somewhat in increasing the water production levels over the years. However, a major challenge that has perennially confronted the managers of the water utility has been the high non-revenue water levels. With respect to the performance of the operators, the research revealed that all three regimes recorded notorious levels of non-revenue water stemming from leakages due to ageing and obsolete networks, pipe bursts, illegal connections, lack of effective monitoring, lack of regular updating of customer data. For instance, from 1987 to 1998, non-revenue water levels ranged between 51 and 63 percent. Also, GWCL failed to reduce the high non-revenue water over the seven years that it operated. Furthermore, a mapping strategy employed by the private operator which significantly exposed the sources of both commercial and physical losses marginally addressed the challenge of the high reduce non-revenue. Albeit in the arrangement, the private operator was tasked to reduce non-revenue water in the service areas by at least 5 percent per year per service area, it could only reduce the non-revenue water by 2.4% over its 5-year period leaving it at 49.22% in 2011. Generally, all three regimes exhibited high levels of inefficiency and ineffectiveness in reducing non-revenue water.

Furthermore, bill collection posed a major challenge to the public water utility and all three regimes recorded high days receivables. Intriguingly, the study revealed that no significant differences were recorded in the means of days receivables among the three regimes. Furthermore, GWCL and AVRL failed to improve on the high days receivables of GWSC and GWCL respectively. The high days receivables stemmed

from Government's delay in paying bills of its MDAs, lax enforcement and consumers' refusal to pay for the poor services rendered. While bill collection deteriorated between 1999 and 2006, the private operator on the average increased bill collection by 13% during the 5-year period of its operation. Financially, no significant gains were made under any of the three regimes. The liquidity position of the utility was very bad and unacceptable during the three regimes with the minimum operating ratio of 66.3%. Technically, for water utility such as this operating above the acceptable limit of 60% hardly could have sufficient funds to take care of its non-operating expenditures. Electricity and Chemical costs were very high and thus constituted the two major cost components of the production cost. Apparently, AVRL failed to reduce chemical and electricity costs as stipulated in the agreement. The long-term debt to shareholder's equity of the utility improved under the private operator with a ratio of 12.54% in 2011 but generally, the utility's creditworthiness has been very low during the three regimes. Assessments of technical and financial and audit reports of GWCL, AVRL including the Fichtner/Hytsa/Watertech and State Enterprise Commission revealed that the level of performance of the private operator was generally poor in areas including non-review water reduction, treatment plant operations, account receivables, bill collection, power consumption, chemical usage and public water consumption which corroborates the findings of this research.

For decades, political patronage, nepotism, cronyism, tribalism and corruption have eaten deep into the fabrics of the public water utility leading to a high labour productivity. Labour productivity in 1999 stood at 28 staff per 1000 connections and 18 in 1998. However, through several institution reforms and gradual expansion of the water supply systems, it was reduced to 8 staff per 1000 connections in 2006 when AVRL took over the management and operations of the water utility from GWCL. Thanks to the private operator as it further reduced it to 7 staff per 1000 connections by 2011 – a figure that could compare fairly well with some well-performing utilities around the globe now. Meanwhile, investments in the water sector had not been systematic and consistent and therefore lagged behind the rate of growth of the urban population.

The set of evaluation indicators used in this study, based on those that have become global best practice for water utilities, appear to work equally well for both public and a partially privatised water utility. Hence, no new way is needed for assessing or evaluating the performance for a management contract. The researcher has approached the analysis of the performance data using the analysis of variance (i.e.

ANOVA), t-Tests, Tukey HSD and straightforward longitudinal comparison of an extensive range of indicators. During the study it became clear that sufficient information would not be available to undertake a more sophisticated statistical analysis of utility performance indicators. It would be possible to investigate the performance through the use of techniques such as Data Envelopment Analysis, combining all the indicators into a form of composite score and comparison through the DEA 'linear programming' approach. DEA is normally used to determine relative efficiencies between operating units rather than the same unit over time though this approach has also been used. In the end, resource constraints precluded the use of this methodology.

The planned comparison with other forms of management contract models implemented in other countries was not achieved in any depth due to the limited academic research data reported in the literature and lack of resources to approach those contractors at a distance.

The question as to how the activities of the urban water supply sector were coordinated among all sector players to ensure effectiveness, efficiency, equity and sustainability in its operations and management was mainly addressed through the detailed analysis of the role of PURC. Quite a number of stakeholders saw a more autonomous and empowered PURC as the natural coordinator and overseer of the urban water supply sector. Otherwise it was unclear as to how the activities of the other actors in the urban water sector influenced the performance of GWSC/GWCL and AVRL. The utility appeared to take its own path and, in effect, managed to reject the imposition of private sector outsiders in its management. It could be suggested that it is even more resistant to influence from other stakeholders. The key determinant of its success, to be delivered by external agents, appears to be an agreed tariff and the increases in that tariff required to deliver and support investment in capital maintenance and capital expansion. Tariff policy did not appear to be able to influence access expansion and waste reduction. It might be therefore that tariffs should not be expected to shoulder the burden of improvement and that, taxes, and maybe transfers, should be given a more significant role. Taxes are now particularly relevant in the context of the discovery of viable levels of oil in the country during the period of this research.

Therefore the relatively minor incentives delivered to the private sector, through the deliberate in-built limitations of a management contract, and perhaps through that contract to some of the staff, did not appear to be sufficient to deliver improvement in performance, in the context of the lack of adequate investment. The contractual framework has not been adequate to address issues of procurement, investment and project implementation. The mechanisms to enforce the contract and resolve disputes were sufficient to maintain the contract during its five year life but were not sufficient to deliver an adequately empowered utility that might be required to extend into a second contract period.

One of the key promises of a management contract is that it might be possible to challenge and transform the organisational culture of an organisation, irrespective of the availability of investment to deliver transformed services. In the example of AVRL it appears that the short tenure of several of the senior AVRL personnel and, apart from the significant transformation of staff training in the early years, a rather clumsy approach to staff re-organisation led the majority of the staff to see no benefit in maintaining the contract. Disempowerment rather than empowerment seems to be the conclusion of the staff.

The overall aim of the research was to assess the suitability of the form or model of private sector participation that was introduced in the regulated urban water supply sector in Ghana and to assess the net improvement that the contract brought to the urban population.

Within the regulatory environment, lack of institutional autonomy and government's interference made it extremely difficult for the regulator to effectively and efficiently perform its functions. To the extent that requests for tariff increases could delay for months simply because politicians felt that, increasing tariffs at a given time would negatively affect the fortunes of their parties also posed a major challenge to the financial sustainability of the public utility. Due to long days in approving new tariffs for implementation, which sometimes lead eventually to high percentages in tariff increases leading to agitations and rejection of tariffs by consumers. Consequently, people describe the actions and consultations of PURC with sector stakeholders as hypocritical and fictitious. It is however believed that if tariffs could be adjusted but staggered over a certain period of time, customers would not have problems with it. Therefore, in

assessing the performance of the urban water utility under the management contract, in addition to the operational, financial and managerial indicators that are usually considered, it is equally significant to situate the evaluation within the context of the political, social, economic and institutional environment or conditions within which the arrangement operated. In view of the aforementioned, the researcher concludes that; the model employed was highly unsuitable as the existing conditions and environment inevitably worked against the service goals set.

Also, this study has found no significant improvement in potable water supply to the urban population or to the viability of the utility attempting to serve that population. The extent to which that is a result of a failure in choice or suitability of the model of private sector participation cannot be proven. However, the hypothesis underlying this study that "a management contract does not provide the necessary level of empowerment, incentives, commitment and access to resources for a private operator to adequately and efficiently perform, even where there is an established economic regulator with a clear mandate" could be said to contain at least a valid level of foresight even if it has not subsequently been provable beyond reasonable doubt by the data available.

The people living in the cities of Ghana continue to wait for an adequate water supply. The institutions and institutional framework could well be described to be 'good enough' with the imposition of a private sector management contract being an unsuitable attempt to solve the wrong problem at this time. The overwhelming need to invest at a suitable level, beyond the affordability of the present urban population, is likely to have been a far more significant challenge.

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Appendices

Survey Forms

Private Sector Involvement in Urban Water Supply Management, Ghana

(Customers' Interview Guide)

The researcher seeks to investigate the performance of Ghana Water Company Limited in Urban water supply management in Ghana.
Please, any information provided will be treated strictly confidential.

Background data

Name of city and community……
Economic activity……
Date …….

1. What is the size of your family?
2. How long have you lived in this community?

i. Less than 4 years. ii. More than 4 years. iii. 4 years

3. Do you get water from Ghana Water Company Limited?

i. No ii. Yes

4. If yes, what is your access route?

i. Piped connection (direct connection)
ii. standpipe
iii. Other sources (please specify)

5. What is the average volume of water you consume in a month?
6. How will you rate the quality of water from GWCL?
   Taste: i. Excellent. ii. Good iii. Fair iv. Poor v. Very poor
   Color: i. Excellent. ii. Good iii. Fair iv. Poor v. Very poor
   Smell: i. Excellent. ii. Good iii. Fair iv. Poor v. Very poor
7. Do you have a meter or is your account metered?

i. No ii. Yes

8. How often is the reading done?

i. Monthly ii. Every two months iii. More than two months

9. How much do you pay monthly for water? (***Please crosscheck with water bills***)
10. Does water flow under sufficient pressure?

i. Yes ii. No

11. How will you describe the way you pay your water bills?

i. Promptly
ii. Always in arrears
iii. Difficult to pay
iv. Others (***please specify***)

12. If you do not have a meter, how much do you pay monthly?
13. How is this amount determined without a meter?
14. Will you prefer your account to be metered?

i. Yes ii. No

Please state the reason(s)

.....
.....
.....

15. How many hours do you receive water in a day?

i. Less than 4 hours
ii. Between 4-8 hours
iii. Between 8-16 hours
iv. Throughout the day

16. How many days in a week do you receive water?
17. Are you notified prior to service interruption?

i. No ii. Yes iii. Sometimes

18. What is your impression of GWCL regarding service interruption notification?

i. Excellent. ii. Good iii. Fair iv. Poor v. Very poor

19. Do you receive your bills regularly?

i. Yes ii. No

20. How often do you receive your bills?

i. Monthly
ii. Every two months
iii. More than two months

21. How long does it take you to pay your monthly bills?

i. 1 month ii. 2months iii. 3months or more

22. Have you ever suffered a disconnection before?
23. What was the cause of the disconnection?

i. Non-payment of bills
ii. Wrongful disconnection
iii. Illegal connection
iv. Others (***please specify***)

……
……
.....

24. Have you ever complained to GWCL?

i. No ii. Yes

25. What was the complaint about? Please tick

TYPE OF COMPLAINT	
Over-billing	
Late or no bill delivery	
Wrong categorization of customer	
Poor accessibility to company	
Stolen/Faulty meter	
Pipe burst or leakage	
Estimated water bills	
Delay in connecting a customer	
Poor water quality	
Non-reflection of payment	
Wrong disconnection	
Complex tariff structure	
No flow	

26. How will you rate the response of GWCL?

i. Excellent. ii. Good iii. Fair iv. Poor v. Very poor

27. How long did it take GWCL to respond to your complaints?
28. How will you describe the attitude of GWCL workers towards customers?

i. Excellent. ii. Good iii. Fair iv. Poor v. Very poor

29. Within the last four years, have you seen some improvements in service delivery of GWCL?

i. No ii. Yes iii. Don't know

Please specify the area(s) where you experienced or observed improvements or deterioration within the four years.

……
……
……

30. How will you describe the services of GWCL within the last four years in terms of value for money?

i. Excellent. ii. Good iii. Fair iv. Poor v. Very poor

Please explain

……
……
……

31. In what area will you like to see GWCL improve its services?

i. Customer orientation and education
ii. Continuous water supply
iii. Prompt service provision
iv. Good customer relations

Please select any three of the above

32. Are you aware that a private operator manages GWCL now?

i. Yes ii. No

33. If yes, do you think the decision of Government to involve the private operator was necessary and crucial?

i. Yes ii. No iii. Don't know

Please explain

……
……

34. Which of the following do you think is the responsibility of the private operator?

i. Provision of reliable and clean drinking water
ii. Investing in infrastructural development of the utility
iii. Maintaining pipes, treatment works and other infrastructure
iv. Others (***please specify***)

.....
.....
.....

35. Which of the following services do you consider as the most important?

Please select only one

i. Provision of reliable and clean drinking water
ii. Provision of cheap drinking water
iii. Provision of meters

36. In your opinion how will you rank the following demands of customers?

i. Accessibility of service
ii. Reliability of service
iii. Affordability of service
iv. Duty of care
v. Community involvement

(Please use numbers 1-5 where 1 indicates the highest and 5 the least)

37. The contract with the private operator will end in the year 2011; will you recommend that the contract is renewed considering the level of performance?

i. No ii. Yes iii. Don't know

Please give reasons

……
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38. What advice do you have for Government on urban water supply?

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FINAL BALANCE SHEET																	
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
	Real	Real	Real	Real	Real	Real	Real	Real	Real	Real	Real	Real	Real	Real	Real	Real
Conversion factor	14000.00	14000.00	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000
	US$'000	US$'000	US$'000	US$'000	US$'000	US$'000	US$'000	US$'000	US$'000	US$'000	US$'000	US$'000	US$'000	US$'000	US$'000	US$'000
ASSETS																
FIXED ASSETS(published)	389,728	373,463	372,088	406,880	404,706	749,071	602,586	378,561	355,745	352,340	323,595	336321	433,165	473185	490377	480601
Intangible assets	1,128	671	366	158												
CURRENT ASSETS																
Stocks(inventory)	5,841	4,805	4,038	6,150	10,867	9,004	8,004	7,518	8,073	7,053	5,325	5246	5,817	6436	6115	7149
Receivables	16,193	15,419	19,416	25,799	27,645	20,217	34,016	55,242	46,188	44,729	22,305	31388	45,185	52889	55546	81839
Investments	1,907	2,414	875	571	146	13	14	42	3,578	7,510	12,977	7941	623	1202	896	998
Cash and Bank balances	2,610	2,652	1,976	4,271	3,620	2,451	6,501	4,433	5,276	5,728	7,525	8737	6,155	7745	5658	5717
Other debtors																
Prepayments																
Total current assets-reworked	26,551	25,290	26,305	36,791	42,278	31,686	48,535	67,235	63,115	65,020	48,133	53311.49	57,781	68272	68216	95702
Total current assets-published	26,551	25,290	26,305	36,791	42,278	31,686	48,535	67,235	63,115	65,020	48,133	53311.49	57,781	68272	68216	95702
CURRENT LIABILITIES																
Bank overdraft	520	437	466	82	1,047	1,064	1,904	899	821	1,553	1,003	15.52	0	11	15	0
Payables	16,584	27,193	18,794	34,388	85,278	135,773	71,765	115,166	59,634	43,268	22,808	45414.18	46,473	63438	55129	73792
Cross debt	0	0	22,464	31,866	0	0	0	0	0	0	0	10246.79	9,877	6547	14954	24948
Total current liabilities-reworked	17,104	27,630	41,724	97,757	86,325	136,837	73,669	116,066	60,455	44,821	23,812	55676.49	56,350	69996	70097	98739
Total current liabilities-published	17,104	27,630	41,724	97,757	86,325	136,837	73,669	116,066	60,455	44,821	23,812	55676.49	56,350	69996	70097	98739
Net Current assets/Liabilities(Working capital)	9,446	-2,340	-15,420	-43,539	-44,047	-105,151	-25,134	-48,831	2,660	20,199	24,321	-2365.00	1,431	-1724	-1882	-3037
Long Term Loans	-87,918	-131,984	-182,334	-317,732	-261,316	-374,811	-437,590	-208,365	-184,589	-144,313	-115,832	-85113.19	-70,818	-81832	-75120	-61514
NET ASSETS(EQUITY)-reworked	312,385	239,809	174,700	238,574	99,342	269,108	139,863	121,365	173,815	228,226	232,084	248842.73	363,777	389629	413376	416049
NET ASSETS(EQUITY)-published	312,385	239,809	174,700	238,574	99,342	269,108	139,863	121,365	173,815	228,226	232,084	262223.97	364,197	389629	413376	416049
Financed by:																
Stated capital	11,793	9,468	7,752	9,869	5,270	3,750	3,092	2,685	2,173	1,944	1,693	1525.93	1,353	1146	988	893
Government grants	25,481	26,831	31,639	73,828	44,215	19,137										
Government equity							0	235,065	226,538	232,940	218,137	210582.20	199,486	177095	152704	138019
Development financing							24,762	21,697	78,692	111,801	117,052	148233.65	261,308	325527	367742	368716
Foreign grants	6,019	14,319	13,719	32,553	27,291	14,683	35,251	17,465	14,134	12,645	12,898	11627.71	10,313	8730	8346	7543
Capital surplus	308,985	244,987	200,577	255,363	152,281	545,702	449,923	254,955	206,336	184,596	160,745	144915.64	128,531	108801	93816	84793
Community water fund	26,667	21,143	17,311	22,039												
Income surplus(deficit)	-66,012	-76,939	-96,298	-155,078	-129,715	-314,164	-373,165	-410,500	-354,058	-315,700	-278,441	-254661.16	-237,214	-231670	-210219	-183915
EQUITY (Audited and published)	312,385	239,809	174,700	238,574	99,342	269,108	139,863	121,365	173,815	228,226	232,084	-254661.16	-363,777	-389629	413376	416049
EQUITY(NET ASSET) reworked	312,934	239,809	174,700	238,574	99,342	269,108	139,863	121,365	173,815	228,226	232,084	262223.97	363,777	389629	413376	416049
Capital employed-reworked	400,302	371,794	357,034	556,306	360,659	643,920	577,452	329,731	358,404	372,539	347,916	333955.92	434,596	471460	488496	477563

Figure 0-16 Final Balance Sheet

INCOME AND EXPENDITURE STATEMENTS	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
	Real	Real	Real	Real	Real	Real	Real	Real	Real	Real	Real	Real	Real	Real
Coversion factor	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000
	US$'000	US$'000	US$'000	US$'000	US$'000	US$'000	US$'000	US$'000	US$'000	US$'000	US$'000	US$'000	US$'000	US$'000
COMMERCIAL & MARKETING														
Personnel cost	1439.48	1636.30	2212.73	1798.78	2715.48	2199.49	2694.01	3347.98	3178.81	3913.13	4758.79	4721.01	7027.87	6808.56
Electricity	3.93	4.47	10.46	0.40	7.92	2.27	5.24	8.96	55.85	27.36	19.32	165.62	27.76	87.09
Fuel & Lubricant	81.04	92.12	102.08	118.19	189.96	149.53	225.55	193.66	227.63	247.72	257.15	349.56	314.69	327.36
Material cost	24.56	279.42	503.26	207.17	47.52	12.18	9.49	11.76	46.21	18.14	15.33	11.06	27.04	32.06
Overheads	2132.03	2418.54	2202.23	1988.86	3484.95	4207.94	3566.80	3456.02	3212.36	728.29	1371.21	5165.96	2249.72	4713.98
Repairs & Maintenance	59.43	67.55	111.37	207.54	119.06	227.84	258.05	210.65	152.07	163.19	143.06	210.40	447.94	281.51
Hiring of equipment	0.29	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.51	118.40	87.80	86.70
Depreciation	139.56	135.02	322.76	255.84	191.53	147.78	112.74	95.13	73.66	63.36	51.69	41.65	42.63	32.28
Loss on sale of fixed asset	0.00	0.00	1128.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sub-total(reworked)	3880.31	4633.75	6593.82	4576.78	6756.42	6947.02	6871.88	7324.17	6946.59	5161.19	6631.04	10783.66	10225.44	12369.53
Sub-total(published)	3880.31	4633.75	6593.82	4576.78	6756.42	6947.02	6871.88	7324.17	6946.59	5161.19	6631.04	10783.66	10225.44	12369.53
GENERAL ADMINISTRATION														
Personnel cost	4013.89	5213.40	5838.99	3002.71	5277.85	5664.05	6432.82	7232.26	7713.70	7805.50	9409.70	9102.53	10547.45	10645.25
Electricity	345.93	446.05	429.34	106.34	413.71	424.73	297.60	334.64	342.25	355.58	302.34	750.77	726.01	692.99
Fuel & Lubricant	643.84	830.19	652.51	367.75	823.86	807.16	1121.12	931.34	1192.04	1277.55	1476.72	1820.73	1356.70	1271.07
Material cost	159.70	205.92	311.36	415.04	275.03	226.27	161.18	397.40	332.21	369.70	341.49	484.33	328.45	371.14
Overheads	4659.81	6060.19	4562.66	2019.51	3146.00	4871.18	4254.58	4643.26	6026.96	9187.48	15281.17	15294.41	6420.31	10424.55
Repairs & Maintenance	941.73	1214.30	1310.64	952.08	1184.67	1705.93	1129.65	1712.11	1905.91	2209.25	2087.27	2694.30	2240.97	2016.11
Bank charges	630.67	813.21	516.69	315.71	1301.24	1237.08	686.75	300.06	267.16	336.20	317.06	357.86	444.86	379.06
Audit fees	33.32	33.58	44.69	42.00	58.13	73.02	69.53	62.20	54.16	63.56	64.96	60.88	57.30	60.71
Directors fees/Allowance	20.04	29.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Depreciation	697.79	675.10	1508.11	1716.86	2043.43	1087.68	825.34	749.47	557.38	501.85	614.12	1243.78	640.36	520.55
Interest on loans	0.00	0.00	10.80	4052.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Others	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1103.21	1573.66	883.54	1592.75
Sub-total(reworked)	12146.72	15521.51	15185.80	12990.73	14523.92	16097.12	14978.56	16362.75	18391.77	22106.68	30998.04	33383.26	23645.94	27974.18
Sub-total(published)	12146.72	15521.51	15185.80	12990.73	14523.92	16097.12	14978.56	16362.75	18391.77	22106.68	30998.04	33383.26	23645.94	27974.18
PRODUCTION														
Personnel cost	1047.37	1723.50	2411.16	2144.49	2532.54	2509.71	3077.86	3585.71	3548.82	4121.97	5033.61	4772.82	7065.66	6519.16
Water treatment Chemical cost	2265.57	3728.12	5141.08	4625.96	6761.19	6870.92	6842.17	4929.80	5804.92	6632.77	5937.71	5356.16	7367.45	7134.55
Electricity	4723.73	7773.16	12895.79	9641.76	12598.24	18169.82	18529.25	17670.69	23328.55	15067.99	16290.05	26525.64	12095.93	19553.15
Fuel & Lubricant	89.89	147.92	122.68	138.56	145.87	146.29	189.46	163.64	190.11	227.88	271.73	271.37	268.65	280.11
Material cost	59.03	161.13	300.39	78.32	62.87	124.24	46.98	43.67	23.82	24.35	62.45	21.41	41.67	61.87
Overheads	222.47	339.71	281.02	312.12	319.94	326.63	543.96	493.39	8.36	561.36	439.00	467.03	7.83	14.89
Hiring of Equipment	0.06	0.10	0.16	0.00	1.87	0.11	0.00	0.00	0.00	0.73	3.20	40.29	32.79	80.86
Lab. Analytical & reagents	0.79	1.30	26.17	14.58	6.03	1.70	10.43	6.84	680.01	49.87	22.22	41.61	587.04	558.95
Repairs & Maintenance	179.84	295.94	384.68	453.05	436.55	591.73	689.37	999.21	794.82	958.57	1205.61	1471.60	1735.75	2436.02
Depreciation	4256.53	4118.10	3749.95	17397.35	13024.25	10048.98	7666.47	6468.67	5008.75	4216.22	3514.74	2831.90	2898.92	2195.15
Sub-total(reworked)	12845.28	18288.97	25313.07	34806.20	35889.35	38790.13	37595.96	34361.63	39388.17	31861.71	32780.32	41799.84	32101.70	38834.71
Sub-total(published)	12845.28	18288.97	25313.07	34806.20	35889.35	38790.13	37595.96	34361.63	39399.00	31861.71	32780.32	41799.84	32101.70	38834.71

INCOME AND EXPENDITURE STATEMENTS	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
	Real	Real	Real	Real	Real	Real	Real	Real	Real	Real	Real	Real	Real	Real
Coversion factor	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000
	US$'000	US$'000	US$'000	US$'000	US$'000	US$'000	US$'000	US$'000	US$'000	US$'000	US$'000	US$'000	US$'000	US$'000
TRANSMISSION/BOOSTERING														
Personnel cost	123.60	229.24	359.86	316.33	397.51	375.51	447.35	615.56	509.56	725.00	849.29	821.69	720.39	663.16
Water treatment Chemical cost	31.97	58.77	186.26	114.68	131.95	35.88	21.81	3.24	77.00	3.48	12.76	41.69	0.00	0.00
Electricity	663.79	1220.13	2050.66	1294.48	1791.42	3009.81	2226.37	2515.35	678.14	1746.14	1941.35	2482.50	250.73	1046.16
Fuel & Lubricant	7.95	14.62	20.86	21.01	24.43	10.65	22.26	15.70	23.32	19.23	24.06	15.44	14.04	61.30
Material cost	13.17	24.20	37.95	44.68	5.00	2.81	4.32	10.37	1.39	11.16	5.36	5.13	5.37	2.29
Lab. Analytical & reagents	1.84	3.39	0.53	29.06	7.22	2.32	7.09	7.40	8.15	2.41	1.85	29.87	11.94	6.27
Hiring of equipment	0.00	0.00	6.50	0.13	0.00	0.00	0.00	0.00	0.00	0.29	8.35	28.01	2.85	5.29
Overheads	15.52	24.60	27.58	22.71	25.88	64.46	38.70	54.64	35.41	39.80	59.10	50.86	46.29	48.20
Repairs & Maintenance	19.44	33.70	24.99	54.95	39.29	116.84	48.99	72.29	54.21	79.38	158.78	385.24	119.03	122.14
Depreciation	488.45	472.57	409.23	1715.67	1281.30	1034.45	789.20	665.89	515.61	443.52	361.81	291.52	298.42	225.97
Sub-total(reworked)	1365.75	2081.21	3124.44	3613.70	3704.02	4652.74	3606.09	3960.44	1902.78	3070.42	3422.71	4151.94	1469.05	2180.78
Sub-total(published)	1365.75	2081.21	3124.44	3613.70	3704.02	4652.74	3606.09	3960.44	1902.78	3070.42	3422.71	4151.94	1469.05	2180.78
DISTRIBUTION														
Personnel cost	989.04	1154.66	1653.32	1459.41	1721.05	1782.75	2121.10	2583.83	2598.08	3171.77	3599.80	3599.28	5223.65	5151.25
Electricity	3.90	4.56	15.77	121.91	124.29	17.01	93.44	30.75	106.81	32.44	50.68	171.18	28.49	76.34
Fuel & Lubricant	105.64	123.33	164.72	192.94	212.28	206.02	324.72	324.32	427.03	381.53	348.61	468.91	508.12	470.54
Material cost	587.29	685.63	1132.62	2138.91	1656.03	1189.62	851.51	1330.13	1212.86	1316.36	1531.64	1572.97	1753.14	1437.66
Hiring of Equipment	3.94	4.60	0.89	0.00	16.85	1.42	0.00	0.37	22.55	87.29	34.01	104.50	221.28	53.88
Overheads	196.14	224.81	333.03	288.62	228.62	336.08	347.87	344.91	448.15	385.78	493.43	591.63	679.35	587.28
Repairs & Maintenance	157.98	184.43	528.88	224.20	477.56	707.91	738.13	928.88	620.11	673.34	937.91	1352.40	2226.57	2150.79
Depreciation	1395.58	1350.20	864.04	5116.87	3830.66	2955.58	2254.85	1902.55	1473.16	1267.21	1033.75	832.91	852.62	645.63
Sub-total(reworked)	3439.51	3732.21	4693.26	9542.85	8267.34	7196.40	6731.61	7445.74	6908.75	7315.72	8029.82	8693.78	11493.22	10573.37
Sub-total(published)	3439.51	3732.21	4693.26	9542.85	8267.34	7196.40	6731.61	7445.74	6908.75	7315.72	8029.82	8693.78	11493.22	10573.37
TOTAL EXPENDITURE	33677.57	44257.66	54910.38	65530.26	69141.05	73683.42	69784.09	69454.72	73538.06	69515.72	81861.93	98812.47	78935.36	91932.57
OVERALL DEPRECIATION	6977.91	6750.99	6854.10	26202.59	20371.17	15274.48	11648.60	9881.71	7628.56	6492.16	5576.10	5241.76	4732.96	3619.59
OVERALL PERSONNEL COST	7613.37	9957.09	12476.06	8721.72	12644.43	12531.50	14773.14	17365.34	17548.98	19737.37	23651.18	23017.31	30585.02	29787.38
OVERALL CHEMICAL COST	2297.54	3786.89	5327.34	4740.64	6893.15	6906.79	6863.98	4933.04	5881.92	6636.25	5950.46	5397.85	7367.45	7134.55
OVERALL ELECTRICITY COST	5741.28	9448.36	15402.01	11164.88	14935.57	21623.64	21151.90	20560.40	24511.61	17229.50	18603.74	30095.72	13128.92	21455.74
Operating Exp(Total exp. -Depreciation)	26699.66	37506.68	48056.28	39327.67	48769.87	58408.94	58135.49	59573.01	65909.50	63023.55	76285.82	93570.71	74202.40	88312.98

Figure 0-37 Final Income and Expenditure Statement *parts I & II*