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Financial Sustainability of Kiosk Water Supply: A Case of Kanyama Township of Lusaka

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Summary

This thesis presents the research study findings on financial sustainability of water kiosk system in Kanyama Township, a peri-urban area within the City of Lusaka in Zambia. Kanyama Township is a heterogeneous mix of planned and unplanned housing developments and lacks adequate drinking water supply. Therefore, as a way of increasing access to drinking water supply, the government has constructed 18 water kiosks in the township. The construction was financed by the Devolution Trust Fund (DTF), a multi-donor basket fund established by the government for the purposes of financing improved access to water supply and sanitation services in low-income urban and peri-urban areas but wholly supported by cooperating partners.

The financing of the construction of the water kiosks by the DTF is in form of a grant to the water utility company with the water utility company retaining the entire water kiosk infrastructure system. Nonetheless, the price of water from a kiosk system is based on a *'social tariff'* which only covers part of the costs of the water utility company with the rest of the costs expected to be covered through cross-subsidization from customers with individual household connections. As such, understanding the sustainability of the water kiosks system *'in time'* whether or not they are simply a *'quick*-fix' solution, long-term solution or simply a temporary measure becomes vital, particularly that the water kiosk system was conceived primarily as a short-term intervention.

The objective of the study was to assess whether or not the water kiosks were a long-term financial sustainable solution for providing drinking water supply in Kanyama Township of Lusaka considering the increase in income of the local population. In order to achieve this objective, various academic literatures were reviewed leading to the development of a conceptual framework as well as a conceptual model. Since the research was exploratory, primary data was collected through a survey which comprised in-depth interviews and household questionnaires. A total of 120 household questionnaires were administered and nine in-depth interviews conducted, of which three were institutions and six were water kiosk vendors. Sample population from the household was randomly selected with the rest of the sample population being purposively selected. Furthermore, snowball sampling was used for selecting respondents from the water kiosk vendors.

The study found that government's contribution to the Fund was through counterpart funding and this varies but does not exceed 25%. Furthermore, it was found that the water tariff in Zambia only covers O&M costs and that the kiosks are capped within the 1st RBT block tariff. But kiosk water is being sold at the price of the 5th RBT block tariff. Nonetheless, the level of satisfaction for the services provided by the water kiosk system was found to be moderate. In addition, 95% of the households were willing to pay the current individual household connection tariff for improved water supply and 65.8% of these were even willing to pay twice this price. The study also found that currently households are paying between 3.6%-6% of their monthly income for water supply.

Going by these findings, the study concluded that the current financing arrangement of the DTF was unsustainable since it was heavily dependent on donor support. Majority of households prefer individual household connection and are willing to pay more, but the hooking-up costs are prohibitive even if households can afford to pay for this improved water supply. Nonetheless, although tariff may cover O&M costs, water kiosks are not a long-term sustainable solution for water supply in low-income and peri-urban areas of Zambia since capital cost is not incorporated in service users fees (water tariffs), among other factors.

Key words
Water kiosk; financial sustainability; water tariff; affordability to pay; willingness to pay

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Abbreviations

AusAID	Australian Agency for International Development
ATP	Affordability-To-Pay
CBD	Central Business District
CEO	Chief Executive Officer
CSO	Central Statistical Office
CU	Commercial Utility
CV	Contingent Valuation
CWF	Communal Water Facilities
DANIDA	Danish International Development Agency
DBT	Decreasing Block Tariff
DTF	Devolution Trust Fund
ECZ	Environmental Council of Zambia (Zambia Environmental Management Agency)
EC	European Commission
EU	European Union
GDP	Gross Domestic Product
GPS	Global Positioning System
GRZ	Government of the Republic of Zambia
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GWI	Global Water Intelligence
IBT	Increasing Block Tariff
SI	Statutory Instrument
JICA	Japan International Cooperation Agency
LA	Local Authority
LCC	Lusaka City Council
LWSC	Lusaka Water and Sewage Company
MD	Mobile Distributors
MDG	Millennium Development Goal
MLGH	Ministry of Local Government and Housing
MoU	Memorandum of Understanding
MSC	Management Service Contract
NGO	Non-Governmental Organisation
NWASCO	National Water and Sanitation Council
O&M	Operation and Maintenance
PNO	Piped Network Operator
PSO	Point Source Operators
RBT	Rising Block Tariff
SPN	Small Piped Network
SPSP	Small-scale Private Service Providers
UN	United Nations
UN-HABITAT	United Nations Human Settlement Programme
UNICEF	United Nations Children's Fund
uPVC	Unplasticised Polyvinyl Chloride
USAID	United States Agency for International Development
UV	Ultraviolet
VDT	Volume-Differentiated Tariff
WCED	World Commission on Environment and Development
WGS 84	World Geodetic System-1984
WHO	World Health Organisation
WSP	Water and Sanitation Programme
WSS	Water Supply and Sanitation
WTP	Willingness to Pay
ZMK	Zambian Kwacha

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Chapter 1: Introduction

1.1 Introduction

Lusaka, the capital city of Zambia, hosts about 32% of the total urban population (UN-HABITAT, 2007). The population of the City of Lusaka stands at 1,742,979 people and has a total of 368,364 households out of the total national population of 13,046,508 people (CSO, 2011b). According to the (WHO/ UNICEF JMP, 2012) estimates, access to improved water supply in urban areas of Zambia is around 87% and, out of which 36% are individual household connections. In 1990, access to improved water supply was estimated to be 89%, out of which individual household connections accounted for 49% (WHO/ UNICEF JMP, 2012). Thus, there has been a decline of about 13% in the number of individual household connections which indicate the increase in the number of households that are not connected with piped water supply -- simply stated, while new households are being built, these are simply not being connected with individual household piped water connections by the Commercial Utilities (CUs). Access to improved water supply for Lusaka is 89.1% out of which individual household connections accounts for 32.3% with 45.6% being public taps and/ or other taps (CSO, 2011a). CSO (2011a) defined improved water supply to include sources of water from protected wells, boreholes, piped water (private taps), public taps, protected springs and rainwater.

There are a total of 33 peri-urban areas in the City of Lusaka and Kanyama Township is one of these peri-urban areas. DTF and NWASCO (2005) defined peri-urban areas as settlements which initially were unplanned (informal or formal settlements) within the areas of jurisdiction of the local authority (LA). The name 'peri-urban' being preferred to 'squatter' or 'shanty' compounds with majority of these areas characterized by high incidences of poverty, high population densities, unplanned nature (ruminant of informality), inadequate or non-existent basic services (such as water supply, sewage, roads, storm water drainage and solid waste disposal) and essentially unhealthy living environment but constitute the majority of the population for urban areas (40% in smaller towns and 80% in big cities) and continues to be areas where most population growth takes place (DTF and NWASCO, 2005). Furthermore, DTF and NWASCO (2005) defined low cost areas as planned residential areas but characterized by informal structures that have over the years been constructed on reserved spaces (for example, spaces between housing units, service lanes) but despite these areas having water supply network infrastructure, this infrastructure is in very bad state of repair -- the low cost areas have progressively acquired the same or at least very similar characteristics as those of peri-urban areas.

1.2 Background

The provision of social services and related infrastructure to low-income urban and peri-urban areas generally lacks despite the areas accounting for the larger population of the cities and town. In Lusaka, for example, over 70% of the population lives in peri-urban and low-income urban areas but occupy less than one-third (30%) of the total land area (LCC and ECZ, 2008). The water supply to Lusaka does not meet the demand and there is a shortfall of at least 267,825 m^3/day. In 2008, the water demand for Lusaka was projected at 400,000 m^3/day (LCC and ECZ, 2008). In addition, only 32.3% of the households have access to individual household connections (CSO, 2011a), with unaccounted for water estimated at 56% (LCC and ECZ, 2008) thereby diminishing the total quantity supplied to the end-users. This, compounded with the problems of erratic water supply, poor water quality and long distances between dwelling and water points makes most peri-urban areas have limited access to safe drinking water. Snell (1998) observed that peri-urban areas are often the least to receive services from water and sanitation utilities.

The water supply network system of the City of Lusaka has not been expanding despite the rapid growth the city is experiencing. This, coupled with the old age of the water supply network system has contributed to the overall poor provision of water to majority of the areas in Lusaka especially the peri-urban and low-income urban areas. According to Sharma and Chinokoro (2010), 64% of the water supply network system in Lusaka is over 20 years old -- of which 18% is over 40 years older; 35% is between 30 and 40 years while 11% in between 20 and 30 years. The water supply network has a typical lifespan of between 20 and 40 years (Komives, Foster, et al., 2005). Furthermore, there are a total of 71,417 connections in Lusaka (66,175 being domestic connections and 5,242 connections being non-domestic). Therefore, assuming that each domestic connection represents individual household connection, this represents a paltry 17% of the total households in Lusaka -- Lusaka has a total of 390,217 households (CSO, 2011b).

As a way of increasing drinking water supply to low-income urban and peri-urban areas, communal standpipes and kiosks systems have been adopted as strategies for improved water supply in these areas. The communal taps serve a limited number of people (average of 33) compared to kiosks (average of 1,500), water kiosk system has been found to be the most appropriate for scaling up improved water supply to low-income urban areas. This intervention appears extremely attractive from the socio-economic point-of-view; both in the short and medium term, due to the huge numbers of would be beneficiaries and the fact that this is being implemented in low-income urban and per-urban areas. *'Kiosk systems are a sustainable and acceptable water supply solution from a social, technical and commercial point of view compared to other tested solutions for the poor such as communal taps, public taps, hand pumps and house connections. Water has to be affordable at the same time sale of water has to cover operation and maintenance costs'* (DTF and NWASCO, 2005). Nonetheless, the water kiosks have to be accepted by the local communities. This, therefore, presents a fundamental design element consideration for the success of the water kiosk system and particularly because *'…income generated from the sale of water cover costs of the provider but is often not sufficient to keep kiosk operators motivated…'* (DTF and NWASCO, 2005). Thus, aspects of the design and built state of the water kiosks need to complement the income of the water kiosk vendors so as to guarantee a highly motivated class of water kiosk vendors.

Whilst the tariffs of water from the water kiosks in Zambia is based on the *'social pricing'* principle (GTZ, 2009), the burgeoning literature on price of water from kiosks show that customers tend to pay much more per unit cost than the customers with household water connections (Le Blanc, 2008; Le Blanc, 2007; WSP, 2005; Goldblatt, 1999). WSP (2005) reported the cost of water provided by the kiosks to be between four to eight times higher than the domestic first block tariff while Goldblatt (1999) documented the cost of water to the consumers being up to 3 to 11 times more for water from vendors and kiosks than consumers with individual household connections.

The use of water kiosk system for drinking water supply in low-income urban and pperi-urban areas of Zambia has become institutionalized. The water kiosk system is being viewed as the solution to improve access to drinking water coverage as well as an appropriate approach to achieve the millennium development goal (MDG) on drinking water supply -- Goal 7 (DTF and NWASCO, 2005). The Devolution Trust Fund (DTF) is supporting Commercial Utilities (CUs) improve coverage to clean water supply through financing various water projects, and amongst these, the water kiosks. Up to May 2011, DTF financed more than 55 projects that resulted in the construction of more than 300 water kiosks which are reported to be serving at least 826,000 people with clean and safe water (DTF, 2007). In 2007, the Fund (DTF) supported the construction of 18 water kiosks in Kanyama Township, targeting a population of 32,650 (DTF, 2007).

1.3 Problem Statement

Kanyama Township is a heterogeneous mix of planned and unplanned housing developments and like all other peri-urban and low-income urban areas in Zambia lacks adequate drinking water supply. Kanyama Township is poorly served with drinking water supplies and the majority of the households do not have access to individual household water connections and where the households are connected, the water supply is unreliable and often unavailable. The failure to invest in the expansion of the water supply network system and the old age of the network system (64% of it being more than 20 years old) are some of the reasons contributing to the poor service of drinking water supply to Kanyama Township.

As a way of providing drinking water supplies to the township, the government through the Commercial Utility, Lusaka Water and Sewage Company (LWSC), with the funding from DTF poverty fund -- a multi-donor basket fund supported by the Germany Development Cooperation (represented by KfW development bank), DANIDA, and European Union -- has constructed water kiosks in the township. A total of 18 water kiosks have been constructed and these are projected to supply drinking water to approximately 32,700 people. Each water kiosk is designed to cater for 1,500 customers on an average (GTZ, 2009). Therefore, accordingly to the design-load capacity, these 18 water kiosks would cater for 27,000 customers. It is clear from the anticipated service coverage level of the 18 water kiosks (~1,800 persons per water kiosk) and the actual total population of Kanyama Township (366,170 people (CSO, 2011b)) that the provision of drinking water supplies in Kanyama Township is still inadequate, and that the 18 water kiosks constructed in Kanyama Township appear to already be 'overloaded'. Nonetheless, it has to be noted that whilst a water kiosks has the ability to provide drinking water to a very large population, the issues of availability of the drinking water at the water kiosk and it's reliability (as and when required) as well as the acceptability of the water kiosk system by the intended beneficiaries, coupled with the issues of affordability need to be investigated as they can never be presumed from these designed attributes. Moreover, the finances being used to construct the drinking water kiosks are largely being provided by Zambia's cooperating partners. This, undoubtedly, brings about the question of long-term sustainability of the drinking water kiosk system.

In addition, the price of water from the water kiosks system is based on a *'social tariff'*. A 20 litre container of water costs ZMK 25 or approximately one-hundredth of a Euro (0.01 Euro). US$1.00 was equivalent to ZMK 4,817 while 1 Euro was equal to ZMK 6,028.03. This price is only sufficient to cover some costs of the provider while replacement costs are envisaged to be raised from cross-subsidization through tariffs paid by customers with individual household connections. It is a paradox, however, that the price of water from the kiosk system is deemed equivalent to the price charged for the first block for individual household connections but yet the same households with individual connections are expected to cross-subsidize the kiosks system.

Therefore, it is important to understand the sustainability of the water kiosks systems -- whether they are either a *'quick-fix'* solution, long-term solution or simply a temporary measure to improve access to water supply to poor urban and peri-urban areas, particularly that water kiosks system was conceived primarily as a short-term intervention. This is particularly important since the rise in income and social status of the residents will demand more suitable water supply in the form of individual household connections. Furthermore, factors of affordability, accessibility and the pricing of the water need to be understood. Related to this is the factor of policy, legislative and institutional setup. In this case, the implied cost of the water kiosks needs to be assessed *'in time'* so as to obtain a much more clearer understanding of the overall benefits than just be swayed by the utter numbers of perceived beneficiaries served. This is particularly important as the *'provider's costs'* covered

by the water tariff of the water kiosks have not been specified, and fundamentally that the revenue generated from the sale of water only cover the *'provider's costs'*. Therefore, analyzing what this *'provider's costs'* component represents will be vital to understanding the long-term sustainability of the water kiosk system in Zambia.

1.4 Research Objectives

Are water kiosks a long-term financial sustainable solution for provision of drinking water supply in Kanyama township of Lusaka considering the increase in income of the local people?

1.4.1 Research questions

1. Does the cost and financing arrangements of the water kiosks guarantee long-term sustainability? What institutional organization and legal frameworks are in place?

2. Does the price of water reflect the investment, operation and maintenance costs?

3. Are the customers satisfied with the water kiosk services? Are they willing to pay more for improved services like household connections?

1.4.2 Research hypothesis

Water kiosks are not a financial sustainable solution for long-term supply of drinking water to low-income urban areas in Zambia

1.5 Significance of the study

There have been several studies conducted on water supply in low-income urban and peri-urban areas in developing nations but the majority of these studies, however, have focused on the characteristic delivery system of drinking water supply to low-income urban and peri-urban areas of developing countries, with very little, if any at all, studies that have been conducted focusing on the sustainability of the various delivery interventions of water supply to these neglected locations of the towns and cities. Majority of these studies, in particular, have focused on the typology of the small private service providers as well as the general prices charged for water by these small private service providers.

Water kiosks system in Zambia is being promoted as an effective way of providing drinking water supplies to low-income urban and peri-urban areas in towns and cities. The water kiosks system is viewed to be a cheap and sustainable water supply solution, from the utility point of view and thus easy to scale-up in all low-income urban and peri-urban areas in towns and cities. This is despite the fact that there are critical decisions that influence the consumers' choice and use of any particular source of water supply. Amongst these include: the ease of access; adequacy (in terms of quantity and quality); availability, among others. These critical decisions need to be incorporated if sustainability has to be realized.

This study, therefore, focuses on assessing the sustainability of the water kiosks systems in Zambia -- particularly its financial sustainability. It is the intention of this study to contribute to the policy direction for the water kiosks system in Zambia. This is fundamental especially that water kiosks have been acknowledged as the most appropriate means of delivering drinking water supply to low-income urban and peri-urban areas of Zambian towns and cities. In addition, this study will endeavour to contribute to the existing knowledge gap on financial sustainability of water kiosks. Financial sustainability will primarily be assessed

through the ability of the water kiosks system being able to continuously provide the drinking water supply and satisfy the varying needs of the intended customers through the provision of adequate quantities and good quality water while at the same time be able to meet its operation, maintenance as well as replacement costs, where need be, through user fees.

Significantly, a research study is a requirement for the award of the MSc Diploma at the Institute for Housing and Urban Development Studies of Erasmus University Rotterdam. Therefore, this study was undertaken as part of the fulfilment of the MSc programme.

1.6 Thesis structure

Chapter 1 is the introduction of the study. It also highlights the problem statement the research objective and questions as well as the significance of the study.

Chapter 2 presents the literature review. The chapter reviews the concepts and theories on water broadly from the economic perspectives to water pricing. Furthermore, the chapter synthesises the concept of sustainability in relation to water supply as well as reviews the trends in water supply in developing nations and specifically looks at the water kiosk system in the sub-region and Zambia as a whole. The chapter concludes by reviewing the willingness and affordability to pay for improved water supply services.

Chapter 3 describes the project study area. Socio-economic and demographic facts are presented about the study area as well as its physical location. The chapter further outlines the water supply system in the study area.

Chapter 4 details the research methods and techniques while chapter 5 presents the study findings and data analysis. A discussion on the findings is also presented.

Chapter 6 presents the conclusions made from the study.

Research instruments and interview transcriptions from the interviews held with the institutions are presented as annexes.

Chapter 2: Literature review / theory

2.1 Introduction

Water is both a social and an economic but finite good (Rogers, Bhatia, et al., 1998; Solanes and Gonzalez-Villarreal, 1999; Gleick, Wolff, et al., 2002). It is irreplaceable for survival, human health and economic growth and has vital cultural and religious value. Therefore, clean water improves the individuals' welfare and generally benefits society as a whole; as such, access to clean water is a basic right for all (Assimacopoulos, 2002).

A huge knowledge of literature on management of this finite but precious resource exits and this continues to grow to date. Amongst these include the application of economic tools and principles on water leading to the full commodification of water. Whilst it is necessitated, and rightly so, that water should be treated as *'an economic good'* (see the Dublin Principles in Rogers, Bhatia, et al., 1998; Solanes and Gonzalez-Villarreal; 1999)) economists have seized the idea and argued that water should be treated as a private good, subject to corporate control, financial rules, markets forces, and competitive pricing (Gleick, Wolff, et al., 2002). Nonetheless, since water is such an important resource with immense value to life, leaving it to the fate of full-markets forces will spell doom to mankind.

In spite of the fact that management of water has evolved -- since the dawn of civilization in Mesopotamia and Egypt to the present 21st Century amid swelled global water utilization -- access to safe water supply is still a global challenge.(WHO/ UNICEF JMP, 2008) projects that 1 in every 8 people currently lack access to safe water supply and the rapidly increasing urban population which is projected to constitute at least 60% of the total global population by 2030 will further exacerbate this situation. Global urban water utilization by people increased over 20 times in the last century (Liang, 2011) and this consumption will outstrip the 2004 global water utilization by the year 2050 (Song et al., 2004 as cited by (Liang, 2011)). Global urban water utilization at the turn of the century (1900) was 200×108 m^3 and 600×108 m^3 in 1950; in 1975 global urban utilization was 1,500×108 m^3 while in 2000, it rose to 4,400×108 m^3 (Bao and Fang, 2007 as cited by (Liang, 2011)).

This chapter reviews the concept of sustainability as well as some main economic concepts of water. Particularly, the chapter reviews the pricing of water and the pricing instruments used. The chapter further reviews the water supply system to low-income areas of developing nations. Case studies of the kiosk water supply system for Kibera, Kenya; Arusha, Tanzania and Zambia are also presented. Furthermore, the general water supply system in the City of Lusaka is reviewed and presented.

2.2 Sustainability

'Sustainable development' is a relatively new concept, and has been used interchangeably with 'sustainability'. Sustainable development was first defined by the United Nations (UN) as *'…development that meets the needs of the present without compromising the ability of future to meet their own needs…'* (WCED, 1987). Although the concept of sustainable development was developed specifically for addressing environmental issues, vis-à-vis the use of natural resources, it has fundamentally taken on different definitions as dictated by its use, orientation and focus (Bloetscher and Muniz, 2006), and hence the evolution of the term to also incorporate economic goals and social equity values, which may explain what (Christen and Schmidt, 2011) termed as *'…a multitude of understandings and conceptualizations being confronted in both science and practice…'*.

Spangenberg and Bonniot (1998) referred to sustainability as a composite and ambitious policy target comprising environmental, economic and social criteria with equal importance

which holistically contributes to a sustainable society. Furthermore, Spangenberg (2002) included institutional criteria as an additional dimension of sustainability and defined it as *'…interpersonal processes, such as communication and co-operation, resulting in information and system of rules governing the interaction of the members of society'* but also echoed the observations that *'…for sustainability to hold the self-reproducing capacities of all subsystems (economic, environment, social and institutional) are to be enhanced in such a way that system maintenance is guaranteed*". Bloetscher and Muniz (2006) sums-up sustainability as a process which can be continued indefinitely -- *'…a course of action that does not include within itself the seeds of its own end or defeat'.*

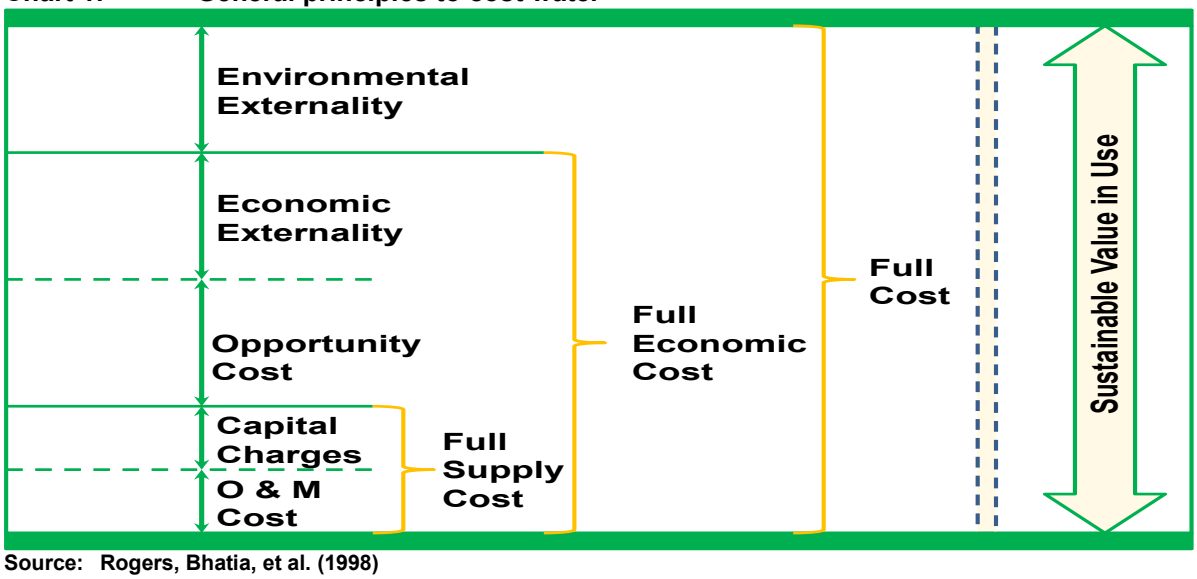
Since the concept of sustainability can be focus-specific, Wande, Reweta, et al. (1998) studied the sustainability of a drinking water supply scheme using equity, billing collection, cost recovery and beneficiary participation as attributes while Armanios (2010) recommended the use of environmental and engineering attributes coupled with economic attributes to optimize the sustainability of the water supply. In addition, Dole and Bartlett (2004) specifically defined financial sustainability of a public utility as: *'A public utility is financially sustainable (or 'sustainable') if it has sufficient funding to meet the financial obligations it will incur in the future. The identified financial obligations must be consistent with maintaining the target level of service, and the funding must be secured, regardless of the source'.* Thus, financial sustainability primarily requires that the tariff raises enough revenue, and it is achieved when all financial obligations are met through such revenue. Nonetheless, sustainability of the water kiosk system in Zambia, on the other hand, is viewed from the social, technical and commercial point of view as well as from a point of view of its acceptability by the community (DTF and NWASCO, 2005). In this study, however, sustainability has been defined from the institutional and legal setup and the financial (i.e. the cost of the water kiosk system and the water tariff structure) aspects. Furthermore, in this definition, the cost of the water kiosk system includes not only, the construction and or investment cost but also the operation and maintenance costs. As a result and for the purposes of this study, the ability of the water kiosk system in Zambia to cover at least its operation and maintenance costs will indicate its levels of financial sustainability.

2.3 Economic Value of Water

Rogers, Bhatia, et al. (1998) details the principle underlying assessing the economic value of water as well as the cost associated with its supply that need to be understood since understanding the cost component of water supply (both direct and indirect) and values derived from its uses -- which is affected by both reliability of its supply and the quality supplied -- are fundamental to coming up with the rational economic value of water. Other important component to consider on arriving at a full economic cost of water is the opportunity cost of supplying best alternative foregone. Rogers, Bhatia, et al. (1998) concludes that for sustainable use of water, values and cost should balance each other out, *'full cost must equal the sustainable value in use'* and thus described *'full cost'* to constitute the full supply cost; the full economic cost, and the environmental externality (see chart 1).

Full supply cost includes costs associated with supply of water to the consumer and it is composed of two separate cost components namely operation and maintenance (O&M) costs and capital charges, both of which should be evaluated at the full economic cost of input. The full economic cost of water, on the other hands, incorporates costs in the best alternative foregone (opportunity cost) as well as economic externality in addition to the full supply cost.

Chart 1: General principles to cost water



Source: Rogers, Bhatia, et al. (1998)

2.4 Water Pricing

Le Blanc (2008) categorizes water provision as a multi-attribute product whose service can be defined by a minimum of three dimensions namely price, quantity and quality. The price represents the unit cost of water but together in combination with the quantity and quality consumed; operation and maintenance costs as well as investment and or replacement costs of the network system constitute a tariff structure. Mathur and Thakur (2003) define a tariff structure as a set of procedural rules that determines the service conditions and charges for various categories of water users. But if the tariff structures have to reflect cost of the utility, the forms of tariff will generally be two-tiers namely a variable part reflecting the marginal costs of producing an additional unit of water for the utility and a fixed part. The fixed part covers the portion of the cost that is linked to the quantity consumed as well as guaranteeing that the utility breaks even.

While pricing of water in the European Union (EU) is guided by the principle of full cost recovery as contained in the Water Framework Directive (EC 2000/160) (Assimacopoulos, 2002), pricing of water in developing countries hardly, if any at all, cover the full operation and maintenance costs (Le Blanc, 2007; Komives, Foster, et al., 2005). Article 9 of the Framework directs member states to *'…take account of the principle of cost recovery…'* by ensuring that *'…water-pricing policies provide adequate incentives for users to use water resources efficiently'*. The Framework further directs member states to ensure *'...adequate contribution of different water users to the recovery of the cost of the water services, based on the economic analyses'*. Le Blanc (2008), on the other hand, analysed the challenges related with tariffs and subsidies of water in developing nations with a specific focus on water pricing in urban areas. The paper points to the fact that the financing of investment in water production and distribution capacities are the most crucial challenges in improving water coverage in developing nations. Similarly, Mathur and Thakur (2003) analysed water pricing instruments, methods and general water pricing structures used in urban areas of India, and observed that setting appropriate pricing was indispensable to providing adequate water as under-pricing of water had damaging long-run consequences which included poor quality water services and lack of investment in expansion of supply network. In addition, Mathur and Thakur (2003) discussed the necessity to include features that promoted social affordability in the tariff structure whilst pursuing economic efficiency and financial viability, but argued that such subsidies on water to the disadvantaged and poorer section of the society needed to be transparent and well-targeted.

Komives, Foster, et al. (2005) reproduced the indicative cost-recovery ranges for water services, based on the survey by the Global Water Intelligence (GWI, 2004), that differentiated between tariffs that generally are insufficient to cover even basic operation and maintenance (O&M) costs (less than US$0.20 m^3) to those tariffs that were probably high enough to cover O&M costs (between US$0.20-US$0.40 m^3), and the tariffs that are high enough to be cover O&M plus some capital costs (between US$0.40-US$1.00 m^3). Furthermore, tariffs above US$1.00 are deemed sufficient enough to cover operation, maintenance, and most investment needs in the face of extreme supply shortages in developing countries (GWI, 2004 as cited by Komives, Foster, et al. (2005)). Le Blanc (2007), on the other hand, observed that in large parts of the world the concept of water as a social good prevails over that of water as an economic good and as a result it is commonly admitted that the full cost recovery is not an appropriate objective in the case of water service.

However, regardless of the tariff structure proposed, Mathur and Thakur (2003) pointed out that the objectives of any type of tariff structure should be to guarantee revenue efficiency; ensure economic efficiency; promote equity, and alleviate poverty. Similarly, Le Blanc (2007) observed that the type of the tariff and the manner in which it is structured will influence conservation of water and above all poverty alleviation.

2.4.1 Instruments for water pricing

Mathur and Thakur (2003) identified three (3) instruments of urban water charging used in India, thus: connection fee or a fixed rate charge; a water tax, and a water charge. In arriving at water pricing tariff, Mathur and Thakur (2003) emphasized the importance of basing such pricing structures on long-run marginal costs of providing water and maintained that prices are efficient when they are set equal to the long-run marginal costs of providing water. Marginal cost in the water sector is determined by the total consumption in the system and not by the quantities consumed by each household fundamentally because a water user does not impose an increasingly high cost on the system with each unit of water consumed (Komives, Foster, et al., 2005).

The water pricing structures in Indian cities were summed up into two broad categories namely volumetric and non-volumetric, with a third tariff structure being a variant type involving a mixture of volumetric and non-volumetric tariff structures (Mathur and Thakur, 2003). The types of tariffs used in Indian cities and towns as consolidated by Mathur and Thakur (2003) include: Increasing Block Tariff (IBT); uniform volumetric charge; linear water charge and a two-part tariff. These water pricing instruments as consolidated by Mathur and Thakur (2003) also represent the pricing instruments that are being used in different nations to price the water supply.

2.4.1.1 Block tariff

A block tariff is a *'stepped tariff in which a different tariff per unit is charged for different blocks of consumption'* (Komives, Foster, et al., 2005). A block tariff could either be increasing (Increasing Block Tariff (IBT)) or decreasing (Decreasing Block Tariff (DBT)). Mathur and Thakur (2003) defined an IBT as a series of prices that increase in step as consumption rise and similarly Komives, Foster, et al. (2005) defined IBT as a block tariff where *the 'price charged rises with each successive consumption block, while in the case of a DBT, the price charged falls with each successive consumption block'*. Both IBT and DBT are a quantity-based subsidy. The block tariff is developed on volumetric component and its fundamental feature is that it contributes to equity by allowing low-income households to pay low rates for water compared to high-income households, at the same time, high-income households tend to subsidize water consumption of low-income household as the

consumption exceeding the size of the initial block attracts a higher price per unit of additional consumption and still a higher price as such consumption exceeds the set limits of the respective block sizes. Three (3) parameters are needed to be defined in constructing an Increasing Block Tariff and these are: i) the number of blocks; ii) size of the blocks in terms of the quantity of water, and iii) price per unit of water in each block. Le Blanc (2008) observed that the IBT in Latin America often included the fixed charge component but it is fundamental that the quantity of the water supplied in the first block is well above what would be a true *'lifeline'* block to meet basic human needs.

2.4.1.2 Volumetric charge

Volumetric tariff structures rely on the quantity of water consumed and can either be uniform or non-uniform. Uniform volumetric tariff structures are a fixed charge per unit of water consumed and are used only under conditions of metered supplies of water. The underlying advantage of this tariff system is its simplicity but at the same time, it hardly offers any incentives for consumers to undertake any water conservation initiatives. Non-uniform volumetric (non-volumetric) tariff structures are applied to unmetered consumptions and may be applied to other measures that are proxies to water consumption.

Conversely, a variant tariff structure that uses a mixture of a uniform volumetric and non-uniform volumetric of which the most common being a combination of a fixed monthly charge and a charge based on a monthly consumption also exists.

2.4.1.3 Linear water charge

Under this tariff plan, the charge of water rises with consumption. The price rise is based on the quantity of water consumed but not on a basis of IBT.

2.4.1.4 Two-part tariff

This tariff plan combines a fixed price for a prescribed minimum quantity of water beyond which the charge may either follow the IBT structure or uniform volume structure. *'Conceptually, a minimum charge is in the nature of a rent payable by all users having a water connection, whether or not water is used'* (Mathur and Thakur, 2003). The design of this type of tariff encourages water conservation as the minimum charge is set lower than the tariffs for the initial block of the IBT -- this offers advantages of lower tariffs to households that consume less water.

2.4.1.5 Volume-differentiated tariff (VDT)

Like the block tariff, Volume-Differentiated Tariff (VDT) also incorporates quantity targeting although this is applied differently from the block tariffs. In a VDT, prices are determined by the unit cost of the quantity of water consumed in a given period, regardless. Assuming a VDT taking a form of two different tariffs -- a flat rate of \$0.10 per m^3 for the first 10 m^3 of water consumed and that of \$0.20 per m^3 for the next 10 m^3 of water consumed -- therefore for the households consuming less than 10 m^3, the first rate will apply while for those households consuming any quantities more than the 10 m^3, the second rate will apply for all units of water consumed. Unlike the IBT, the VDT does not provide any subsidy for households that consume more than 10 m^3 a month (Komives, Foster, et al., 2005).

2.4.1.6 Tariffs on unmetered supplies

Common tariff structures are those based on annual fixed rates -- a fixed charge tariff structure. This type of tariff structure should preferably be set in accordance to the size of connection. Le Blanc (2008) noted that *'… in the absence of metering, only fixed charge*

tariffs can be implemented…'. Under unmetered supplies, consumers pay a certain amount independent of the volume used. This tariff structure does not offer any incentives for promotion of water conservation although its main advantage is its simplicity.

2.4.1.7 Subsidies

According to Komives, Foster, et al. (2005), one reason why subsidies are prevalent in water utility services is explained by the inherent cost structure; particularly the high investment cost ratio of fixed and non-attributable costs, coupled with the high capital intensity and long asset lives as *'a high share of fixed costs means that marginal cost pricing does not necessarily allow full cost recovery in the short run, thus providing a justification for government transfers or price mark-ups to close the financial gap'*. Komives, Foster, et al. (2005) further explained the reasons as *'…the relatively high proportion of fixed costs to total costs, which means that the economically efficient pricing solution (marginal cost pricing) will, in any situations, not lead to full cost recovery while the relatively high percentage of non-attributable or common costs, which are difficult to allocate precisely to different customers, and the high capital intensity combined with long asset lives, which collectively make it feasible to get away with under-pricing services in the short or medium term'*.

There are two dimensions of subsidy design namely consumption versus connection subsidies, and targeted versus untargeted subsidies (Komives, Foster, et al., 2005). While consumption subsidies seek to reduce the cost of consumption, connection subsidies seek to reduce the cost of connecting to the network and as the result connection subsidies are a one-off subsidy whereas consumption subsidies are a continuous type. Nonetheless, both of these subsidies may either be targeted (implicit targeting or explicit targeting) or untargeted -- targeted subsidies benefits only a subgroup of utility customers but untargeted subsidies occurs when there is a general under-pricing resulting into certain costs not being passed on to the consumer. Explicit targeting is a conscious attempt to reduce the cost of service or the cost of connection for customers with a particular characteristic (for example, poor households, households in informal settlements, or households that use little electricity) whereas implicit targeting is the unintentional result of common pricing practices of utilities and the most basic form of implicit targeting is charging one-flat connection fee or one-flat monthly service fee to all households for water supply (Komives, Foster, et al., 2005).

Increasing block tariff (IBT), decreasing block tariff (DBT) and volume-differentiated tariff (VDT) are all forms of explicit targeted tariff incorporating quantity targeting and are commonly used in water supply services on metered customers. However, Komives, Foster, et al. (2005) observed that it was not unusual to misunderstood that quantity-targeted tariff structures generally sought to represent the underlying cost structure for the relevant service, which was generally not the case, as it was clear in the water sector that *'…the marginal cost is determined by the total consumption in the system, not the amount consumed by each customer. A water user does not impose an increasingly high cost on the system with each unit of water consumed'*. Therefore from this perspective, Komives, Foster, et al. (2005) concluded that quantity-based tariff structures merely represent alternative ways of allocating system costs across customers to meet cost recovery or social objectives and generally they cannot be justified in terms of reflecting underlying economic costs.

2.5 Drinking Water System in Zambia

All functions related to provision of water supply and sanitation services are a responsibility of the Local Authorities (LAs) under the overall supervision and support of Ministry of Local Government and Housing (MLGH). Nonetheless, through commercialization, the LAs outsourced the management of WSS services to private enterprises formed by joint ventures with other LAs which are commonly referred to as the Commercial Utilities (CUs).

Commercial Utilities are thus responsible for urban water supply in Zambia. The CUs are regulated by the National Water and Sanitation Council (NWASCO), a statutory body established by the Water Supply and Sanitation Act No. 28 of 1997. This Act prescribes the powers and functions of NWASCO which include licensing of the services providers; developing sector guidelines (which include setting of tariff, establishment of service providers); establishing and enforcing sector standards (The Water Supply and Sanitation Act, 1997), among others.

Amongst the guidelines developed by NWASCO, include (NWASCO, 2011):

- **Minimum service level guidelines** which elucidate the minimum services that the CUs should strive to provide.

- **Water quality monitoring guidelines** which defines the water quality tests to be conducted and the acceptable standard.

- **Tariff setting guideline**s which shows the process that CUs should follow when setting water and sewerage tariffs.

- **Water supply for peri-urban areas guidelines** which details the strategies for water supply delivery to peri-urban areas through the Devolution Trust Fund (DTF).

Unfortunately, CUs tend to concentrate their efforts in developing and improving water supply services to high income areas at the detriment of peri-urban and low-income urban areas. NWASCO (2011) observed that the majority of the CUs tended to concentrate in the high income areas for development and improvements of water supply and sanitation infrastructure where there was a higher rate of return on their investments, the orientation which has to a larger extent disadvantaged many communities in the low-income urban areas as well as those in peri urban areas. The DTF was thus established to *'…promote among others the extension of public water distribution systems and onsite sanitation in low-income urban and peri-urban areas'* (NWASCO, 2011). The Government of the Republic of Zambia (GRZ), through the provisions of the Water Act No. 28 of 1997, issued Statutory Instrument (SI) No. 50 of 2001 to establish the DTF as a basket fund for extension of service in the low-income areas and only became operational in 2003 (NWASCO, 2011).

The CU responsible for the supply of drinking water to the City of Lusaka is the Lusaka Water and Sewage Company (LWSC). Sources of water for the City of Lusaka are the 71 boreholes within and around the City as well as surface water from the Kafue River which is located some 65 km south of Lusaka. The water supply pipe network system comprises 109 km of transmission line and 1,199 km of distribution line. The water supply is intermittent with the supply only available for at most 16 hours. The characteristic distribution pressure ranges between 5 to 50 m while the pipe age of 53% of the network is over 30 years old (Sharma and Chinokoro, 2010). Unfortunately, the quantity of water supplied to Lusaka has remained relatively unchanged over the past two decades despite the population doubling within the same period (population of Lusaka was 991,226 people in 1990). In 1993, the volume of water supplied to the City of Lusaka by LWSC was 210,000 m^3/day and the same volume was being supplied in 2005 (LCC and ECZ, 2008). The estimated daily water demand in 2000 was 287,825 m^3/day and this demand was projected to reach 400,000 m^3/day in 2008 but the water utility company was only supplying water in the range of 200,000 m^3/day and 220,000 m^3/day (LCC and ECZ, 2008). Clearly, water demand for the City of Lusaka is not being met and the peri-urban settlements like Kanyama Township have to endure the consequences of this inadequacy. This, in fact, supports the observations made by (Ringskog, Hammond, et al., 2006) that *'poorly served customers are driven to invest in costly alternative sources of supply thereby forcing the poor households who are*

often excluded from public services to resort to unsafe and ultimately much costlier alternatives -- if they can afford them at all'.

LWSC has only managed to connect to a partly 36% of the total households to the City Water Supply Network System, leaving the majority of the households without piped water connection with the worst hit being peri-urban areas and low-income urban areas. The City Water Supply Network System has never been expanded since the 1970s when the major investments in water supply were made following the massive upgrading and development of new residential areas (townships) in Lusaka. Whilst residential areas have continued to expand, these have not been matched with the expansion in the water supply network system -- in fact, the water supply network system has remained static (never expanded) -- and this state of affair is not likely to change in many years to come. It does not seem possible and later on feasible both in the medium term (10 years) and long-term (20 years) and beyond to have a project that will embark on connecting households in low-income and peri-urban areas to the main water supply network system of the city.

DTF and NWASCO (2005) classified water supply systems in peri-urban areas into three (3) namely communal taps, public taps and water kiosks. This classification is based on two (2) attributes namely how the water outlet is managed and who has access to the water supply and how. Communal taps are managed by the community and access is usually restricted to a specific user group. However, access to water supply from a communal tap is further restricted through a user fee. Public taps on the other hand provide water free of charge and there is no defined user group. Water kiosks are managed by the Commercial Utility (CU) and access to water supply is open but at a fee. Kiosks are metered and customers have to pay according to consumption (DTF and NWASCO, 2005).

2.5.1 Drinking water tariff system in Zambia

NWASCO approves all drinking water tariff adjustments in Zambia. All proposals in connection with adjustments to the drinking water tariffs made by the CUs are submitted to NWASCO for review and consequent guidance prior to approval and effecting. In principle there are three (3) types of tariffs plans offered by the LWSC for water consumption, namely: 1) the metered domestic consumption; 2) unmetered domestic consumption, and 3) metered non-domestic consumption.

Metered domestic and nondomestic consumption tariff is based on the increasing block tariff (IBT). The IBT for domestic consumption has five (5) blocks, each having a different tariff chargeable per unit of water consumed. The unit of water consumption is a cubic metre (m^3). Table 1 gives the approved tariffs for 2012 for the metered domestic consumptions within the City of Lusaka.

Table 1: Approved tariffs of domestic metered consumption for 2012

Consumption block (m^3)	Tariffs (ZMK)
0-6	2,400
6-30	2,700
30-100	3,100
100-170	3,800
Above 170	4,800

Source: (LWSC, Undated)

Non-metered domestic consumption tariffs are based on non-uniform volumetric charges. Thus, a fixed monthly charge is levied on customers regardless of the quantity of water consumed. These tariffs are also different from one residential area to the other -- low cost residential areas pay the lowest cost per month while the high cost residential areas pay the

highest water consumption charges per month. The monthly tariffs for water consumption applicable for unmetered consumptions are presented in table 2.

Table 2: Approved tariffs of domestic unmetered consumption for 2012

Consumption block (m^3)	Tariffs (ZMK)
Low cost	76,608
Medium cost	148,008
High cost	329,962
Communal taps	11,000
Water kiosks	1,250 m^3/day

Source: (LWSC, Undated)

2.6 Trends in Water Supply to Low-income Urban Areas in Developing Nations

Water supply is capital-intensive. *'Compared to other utilities like telecommunications and electricity, water production is very capital-intensive. Moreover assets used in water supply cannot be moved to another location and are generally unusable for any other purpose; they represent an extreme type of fixed capital, associated with sunk costs'* (Le Blanc, 2008). Komives, Foster, et al. (2005) showed that investments associated with capital costs in the network components of electricity and water services range from 70 percent to 90 percent of the total costs and these have asset life ranging between 20 and 40 years while the network components of telecommunication has a much lower level of capital intensity (25-45%) and substantially shorter asset life (10-20 years).

Low-income urban and peri-urban areas are the least served areas and the last to receive any basic services such as drinking water supply from the water utilities (Snell, 1998). This is despite the areas being resident to majority of the population of the towns and cities. The failure by the government to provide these basic services, especially drinking water supply, exposes the residents to undesirable exploitation by providers of such services and ultimately ends up paying more for drinking water, in terms of unit price, than the other income class (middle and high income) residents who basically have household piped water connection supplies (Snell, 1998; Goldblatt, 1999; WSP, 2005; Kariuki and Schwartz, 2005; Ringskog, Hammond, et al., 2006; Le Blanc, 2007). In general, standpipes and water kiosks as medium priced and *'the next most expensive'* to the high priced water supplied through *'water truckers, carters and carriers'*, with the home connection based on the volumetric tariff being the least expensive (Snell, 1998).

Drinking water delivery in low-income and peri-urban areas is commonly characterized by small scale and informal private sector, ranging from individuals and sole proprietorship to small business enterprises. (Snell, 1998) broadly called these water service providers as small private providers and classifies them according to the following dichotomies: piped water vs. water delivered by vehicle or on foot; water supplied from a water company vs. water from a source controlled by a small provider; systems managed by a community vs. systems run by a private entrepreneur; and whether construction is financed by the system's owner/operator, the community receiving services, or the principal donor, to give the following categories of small private providers, thus:

- **Providers in permanent partnership with water utilities**, whose water they distribute at kiosks or standpipes: water kiosks in Nairobi, Kenya; standpipes managed by communities in Dakar, Senegal, Mopti, Mali, Port-au-Prince, Haiti, and Dhaka, Bangladesh; and a micro-enterprise-community-association standpipe partnership in Segou, Mali.

- **Pioneers who bring piped water from their own sources to communities** where water utilities have not yet expanded their networks: aguateros in Asuncion, Paraguay; community-built water systems in Buenos Aires, Argentina, (and El Mezquital, Guatemala City, Guatemala); entrepreneur-built water systems in Guatemala City, Guatemala, (and Cuzco, Peru); and water centers selling UV-purified river water in Manila, Philippines.

- **Mobile water truckers, carters and water carriers** who provide water (mostly drawn from water company taps) at times and places that water utilities are unable to serve: in Dakar, Senegal, Port-au-Prince, Haiti, (and Lima, Peru).

- **Community-managed water system** in Dhulikel, Nepal.

In their work, Kariuki and Schwartz (2005) termed these service providers as 'Small-scale Private Service Providers (SPSPs)' and classified them generally according to the *'relationship to the sources of water (whether dependent or independent)'* and type of *'technology employed'* and further categorization the SPSP based on piped network operators (PNO), point source operators (PSO) and mobile distributors (MD), as presented in table 3 and further synthesized in chart 2.

Chart 2: Topology according to source and technology used

		Relationship to source	
		Dependent (source supplied by utility)	**Independent (develop own source)**
Technology employed	Small piped network (SPN)	Community SPN Private SPN	Community SPN Private SPN
	Point source	Public standpipe Private standpipe (kiosk) Household reseller (informal standpipe	Private standpipe (kiosk) Community standpipe
	Mobile distributor	Water tankers Carters: Animal traction carters Hand carters Water bearers	Water tankers Carters: Animal traction carters Hand carters Water bearers

Sources: Kariuki and Schwartz(2005)

The water market in low-income and peri-urban areas is heterogeneous and composed of many actors. Chart 2 synthesizes the different categories of alternative providers predominant in delivering of water in low-income and peri-urban areas according to the relationship to the water source and technology employed in water service delivery. Formal alternatives include public standpipes and/ or kiosks, which can be managed under a variety of schemes while informal alternatives include sources that resell network water. According to the categorization by Snell (1998), these are *'providers in permanent partnership with water utilities, whose water they distribute at kiosks or standpipes'*.

Table 3: Categorizing water supply

Technology used	Features		
	Functional characteristics	**Dependent operator**	**Independent operator**
Piped network	**System**	Operator buys water in bulk from utility and develops distribution sub-networks connected directly to households, institutions and public kiosks stand posts	Operator develops own water sources (wells or boreholes) and connects network to households and other users
	Organization	Private company or individual, community organization or neighborhood association	Sole proprietor, cooperative, private land and housing developer, water user association, community-based organization
	Regulatory issues	Contract with utility, business license, customer agreements, bulk rates, customer tariffs	Groundwater abstraction permits, title deeds, resale permits and/ or licenses, water quality testing, business licenses, rights to own infrastructure and/ or to lay networks in public rights of way
Point sources	**System**	Kiosk or stand post connected to the utility network (could be household supply); buying water in bulk - at a special tariff - or at household tariff	Water point linked to own source (well or borehole, underground or aboveground storage tank) installed privately and operated on a for-profit basis. Water may be purchased from a tanker
	Organization	Individual, enterprise, self-help group	Neighborhood association, microenterprise, community based organizations
	Regulatory issues	Contract with utility, license and/ or permit, customer tariff, bulk purchase price, performance incentives	Groundwater abstraction permit, license, tariff structure, water quality testing
Mobile distributors	**System**	Tankers or truckers obtain water in bulk from the utility (or municipal supply) and deliver it directly to the customer, including public utility water storage tanks, communal cisterns, or individual households and institutions	Tankers, truckers or carters develop source or obtain water from a private well for distribution to households; public utility water storage tanks, communal cisterns, or institutions
	Organization	Sole proprietor, tanker association, lessee, informal sector	Sole proprietor, tanker association, lessee, informal sector
	Regulatory issues	transport license, business license, tanker cleanliness, bulk rate, utility contract, customer tariff	Transport license, business license, water quality, abstraction permit

Sources: Kariuki and Schwartz (2005)

Drinking water supply in low-income and peri-urban areas in Kenya, Tanzania and Zambia adopts a compromise of a mix of dependent and independent operators with the independent model being more dominant in Kenya as opposed to Tanzania and Zambia where the dependent model is the one commonly implemented.

2.7 Water Kiosk System in Kibera, Kenya

Water kiosks are the main means for the supply of water to the more than half a million poor people with little or no access to the utility water supply in the informal settlement of Kibera in Nairobi, Kenya. This burgeoning informal water market has more than 650 local entrepreneurs selling water through kiosks scattered throughout the settlement (WSP, 2005). The water that is sold from the kiosks, in majority of the cases, is supplied from the Nairobi City's main distribution water supply network system, although some of the kiosk operators have their own tube-wells. Access to the main water distribution network is gained through laying lengths of pipes by operators of kiosks, in some cases up to 1.5 km long, to reach the few trunk main. This informal network is connected to the storage tanks which are commonly constructed from corrugated galvanized irons sheets and have storage capacities ranging from 2 m^3 to 6 m^3. It is from these tanks where the water is sold by the kiosk operators to the customers, who collect it using 20 litres jerry cans.

Poor quality of the water sold at the kiosk is one of the major problems for the water kiosk system in Kibera, Nairobi. The contamination of the water occurs on two fronts -- along the informal network due to poor quality of materials used as pipe network and at the kiosk because of poor maintenance of the storage tanks coupled with unhygienic handling of the water. The very fact that kiosk operators lay pipes along existing channels which include open sewers full of solid waste and contaminated water coupled with the use of low quality plastic pipes allows contamination of water during its transportation from the utility network to the kiosk -- the majority of the kiosk operators use low quality plastic pipes to reduce costs, as metal pipes are much more expensive and could be stolen and intrinsically because plastic pipes have the added advantage of being flexible enough to follow the winding and irregular paths found in most of Kibera (WSP, 2005).

In general water kiosk users in Kibera, Nairobi pay higher prices for the water. WSP (2005) associated this high price of water to the costs of establishing and running the kiosks. The typical costs of the water is eight (8) times higher than the lowest block of tariff at domestic connections and four (4) times higher than the average tariff in Kenya (WSP, 2005). The lowest block of water at domestic connection (0-10m^3) is charged at \$0.16 per m^3. One of the reasons for the high price of water is the fact that the kiosks are usually registered as domestic connections and hence are charged the tariffs according to the prevailing tariff structure, the increasing block tariff. Therefore, this means that at higher consumption rates they end up paying high retail rates and ultimately at the highest block of the tariff, each additional cubic meter purchased by the operator costs \$0.47 per m^3 and as such this pushes the price of water into the highest blocks of the tariff (WSP, 2005). Consequently, these costs, together with the investment costs as well as the overheads incurred by the kiosk operators, translate into very high water prices at kiosks.

2.8 Water Kiosk System in Arusha, Tanzania

Public water kiosk system in Tanzania has been in use for over 30 years as a means of providing drinking water services to the poor majority and they originally provided free water services in line with the socialist policies that the Tanzanian government was pursuing at that time (Wandera, 2000). (Wandera, 2000) identified two (2) types of communal water facilities (CWF) in Arusha, namely the kiosks and a mixture of standpipes as well as domestic points. All these CWF are owned by the utility but operated by various local

administrative units acting through the street chairpersons for day to day operation of the water sale. All operation and maintenance including the meter and the kiosk structure are the responsibility of the water utility company whilst the street chairperson is responsible for the operational needs of the kiosks including maintenance of the service pipelines between the water meter and the taps, as well as repair and/ or replacement of worn out taps and the supervision of the service delivery. All the water kiosks are metered and are billed according to consumption.

The kiosks were constructed by the utility through a grant from the KfW, a Germany development bank, in 1993 (Wandera, 2000), and since then no new CWF has been constructed. Water is sold to the public water kiosks at the price of \$0.20 per m^3 by the public service provider (water utility company) and the utility recommended retail price is \$0.31 per m^3 but according to (Wandera, 2000) the market price of the water from the public water kiosk was \$0.63 per m^3 -- none of the kiosk was selling the water at the utility recommended price of \$0.31 per m^3.

An important conclusion drawn by (Wandera, 2000) with regards the sustainability of the public water kiosks in Arusha, Tanzania is that the public water kiosks were not sustainable in the long-term for a number of reasons, one such reason the kiosks are in permanent construction format and yet the retail water trade is ideally in a state of flux thereby establishing a fundamental conceptual contradiction since the retail water business is particularly a function of the municipality's development and their use rendered redundant in areas where residents have since acquired private water connections and hence closing down -- thus, the market of kiosk water diminishes with the increase in private water connection. The other reason attributed to the lack of sustainability of the public water kiosks was the outrageously low price of the water.

2.9 Water Kiosk System in Zambia

A water kiosk is an outlet through which formal water providers deliver safe and reliable water at affordable prices to residents in low-income areas (GTZ, 2009). The concept of water kiosks was developed upon realizing that there exists not many technically feasible options for the provision of drinking water supply to the low-income urban areas due to lack of funds for large-scale rehabilitation and extension of existing central water supply systems. Commercial utilities (CUs) own the water kiosks and are responsible for their construction, operation and maintenance, although the day-to-day operation is delegated to a water kiosk vendor recruited from within the community. All water kiosks are metred to allow proper accounting for the water supply by the formal water provider with the exact location of a particular water kiosk being determined by the number of customers, the per capita average consumption and as well as their ability and or willingness to pay -- *'using these criteria ensures the sustainability of the system and allows the water provider to cover the operating and maintenance costs of the kiosk'* (GTZ, 2009).

Investment capital for the water kiosks is financed through the DTF (poverty fund) -- a multi-donor basket fund -- with the majority of the funds coming from the governments of Denmark, Germany and the European Union. The DTF is an instrument specifically designed to provide financing to the CUs to enable them to extend WSS services to low-income urban areas (GTZ, 2009).

The number of kiosks built in any given area is determined by assessing the potential income for the kiosks operators which in turn is dependent on the number of customers, average daily consumption as well as the ability and/ or willingness to pay. Thus, sustainability of the water kiosk system in Zambia is ensured by these four variables -- adequate income for the operator; average daily consumption; ability to pay and willingness

to pay -- which in turn necessitates the water provider to cover the operating and maintenance costs of the kiosks (GTZ, 2009).

The water Kiosk system in Zambia is viewed as an effective solution for reliable and safe drinking water supply to the densely populated low-income urban and per-urban areas at affordable prices; it spars economic development and has very high positive environmental health impacts on the community has a whole. The price for a 20 litres of safe water from the Zambian water kiosks has been fixed at the equivalent of about one-hundredth (0.01) of a Euro, although this tariff system does not include the replacement cost of the entire system, a burden which is borne through cross subsidies by consumers with household connections (GTZ, 2009). This tariff is based on Zambian social tariff structure. Nonetheless, the cost recovery tariff of the water kiosk system which includes the replacement cost of the entire system is estimated to be 0.15 Euro. Furthermore, the structural design of the water kiosks has been found to be a critical component for the successful and sustainable operation of the kiosk and therefore a provision is made for the kiosks to be used for additional income generating activities such as the selling of other goods by including shelves and adequate space since these have been seen to be fundamental to keeping the motivating of the vendor high because *'the income generated from the sale might be enough to cover a provider's costs although insufficient to keep the kiosk vendor motivated'* (GTZ, 2009).

Water kiosk vendors work on a commission -- this commission ranges between 30% and 40% of the monthly water sales -- and since the sale of water only provides the water kiosk vendors with a small income which obviously needs to be supplemented and this is achieved through the sale of other goods at the kiosk. These goods sold at the kiosks are provided by the kiosk vendors and the only contribution from the water providers is the space within the kiosk which is *'rented-out'* to the kiosk operator at *'no-cost'* (GTZ, 2009). A special department known as the *'peri-urban unit'* has been established within the CUs with the sole responsibility to manage and ensure proper functioning of the water kiosks. Peri-urban units introduce the necessary measure, guidelines, procedures and sanctions (GTZ, 2009).

A total cost of ZMK 555,822,998.81 was spent on the Kanyama Water Supply Project. This financing agreement covered the works of constructing and laying a 9 km '3 inch-diameter' uPVC and a 1.5 km '4 inch-diameter' uPVC pipe network system as well as the construction of the 13 open water kiosks and the 5 closed water kiosks, it was concluded on August 10th, 2007 (LWSC, 2007).

2.10 Willingness and Affordability-to-Pay for Improved Services

Willingness-to-pay (WTP) is the maximum amount which beneficiaries are willing to pay for certain hypothetical service while affordability-to-pay (ATP) is considered as the amount which the beneficiaries can pay for certain services and is calculated with reference to household income and composition of household expenditures in the service area (Fujita, Fujii, et al., 2005). The ceiling for the affordability-to-pay ratio of water and sanitation tariffs to total household expenditures is generally believed to be 5.0% and this ratio declines as per capita gross domestic product (GDP) increases principally because the share of expenditure on water and sanitation services as Basic Human Needs decreases due to increased income level and change of expenditure structure of households (Fujita, Fujii, et al., 2005). The World Bank sets as ceiling benchmark of ATP at 4% for water service and 1% for sanitation service of household's disposable income thereby giving a total 5% for water and sanitation services (JICA, 2002 as cited by (Fujita, Fujii, et al., 2005)).

The origins of WTP is credited from the economic theory -- consumer theory -- and expressed in currency to represent effects in accordance with the variance in indifference curves between two points of time, namely: the present, at which the environment has not undergone improvement, and a future time, at which the environment is supposed to be improved; and the variance in the effects (Fujita, Fujii, et al., 2005).

Willingness-to-pay for improved services has been studied using different methods amongst which is the contingent valuation (CV) technique (Whittington, Lauria, et al., 1991; Mcphail, 1993; Goldblatt, 1999; Fujita, Fujii, et al., 2005; Genius, Hatzaki, et al., 2008). Willingness-to-pay studies are simply household surveys in which a member of a household is asked a series of structured questions which are designed to determine the maximum amount of money the household is willing to pay for a good or service and they are also termed as contingent valuation studies because the respondent is asked about what he or she would do in hypothetic or contingent situation (USAID, 1988). Contingent valuation technique is used to elicit people's preference and estimate their willingness to pay for their service of choice and it is the value that a household places on a change in the supply of a good that can be inferred from its present behaviour through the stated choices that a household declares when confronted with a hypothetical scenario of a supply change (stated preference) (Genius, Hatzaki, et al., 2008).

However, extreme caution has to be exercised, especially in attempts to infer the obtained WTP results to other areas despite absolute and/ or relative similarities in the two areas since fundamentally because CV technique provides an estimate of how a certain group of respondents living in a certain area at a given time value their environment. Other attributes that need to be borne in mind whenever analysing data obtained through CV techniques, include (Fujita, Fujii, et al., 2005):

- WTP depends on people -- by the mere fact that WTP reflect people's valuations on environment and public goods, the amount varies depending on person

- Existence of bias -- budget constraint bias and scenario transmission errors are among the biases that make WTP no more than just an estimation derived from CV technique analysis based on the hypothetical situation communicated to the respondent

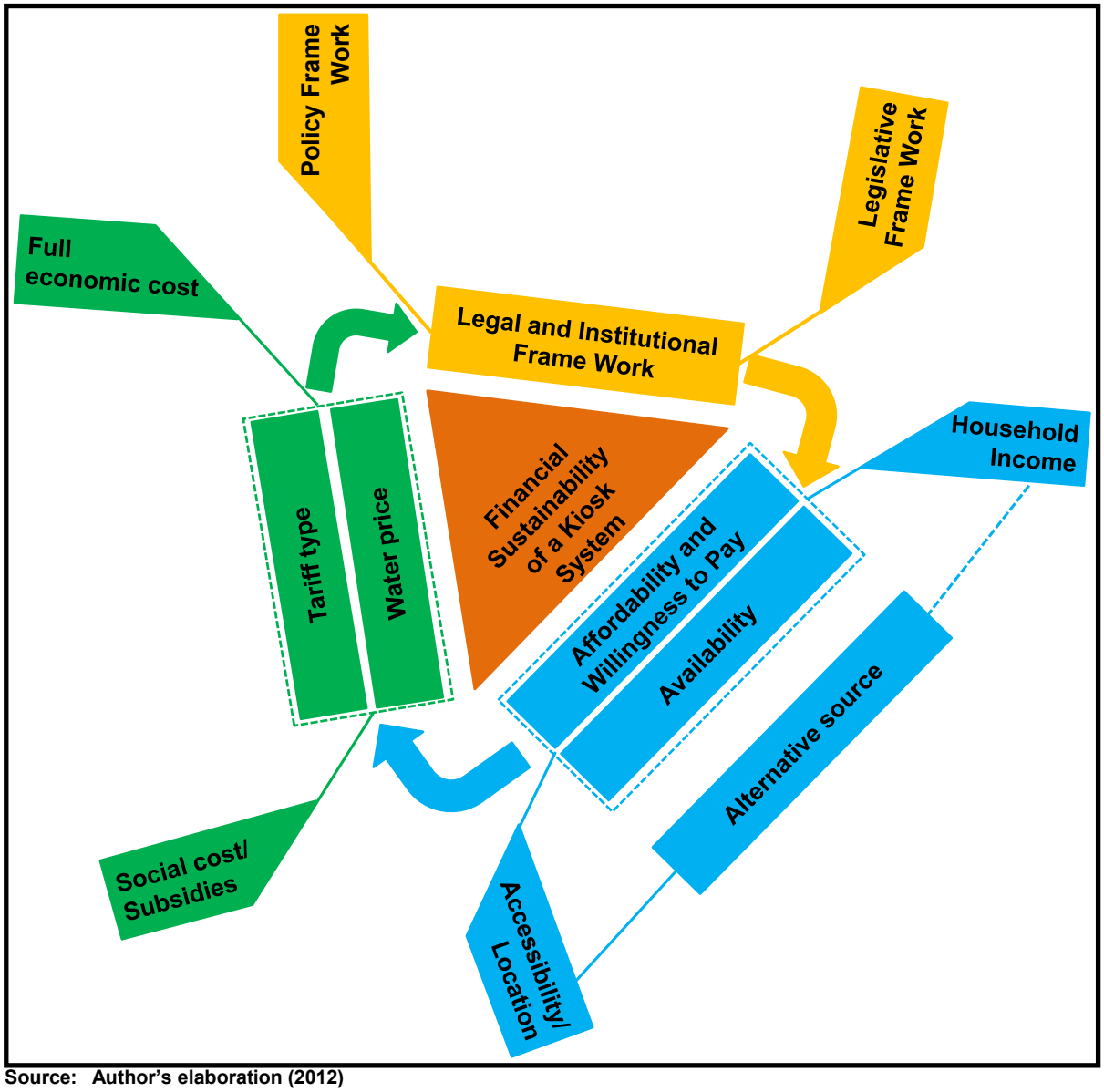
Nonetheless, the important lesson from all the CV studies reviewed is the high willing-to-pay for improved service delivery by respondents. Mcphail (1993) study results of the surveys in the five cities of Morocco showed that many low income households were willing and able to pay more than 5% of total household expenditures for individual water service; mean WTP of Rethymno citizens for improved water quality and quantity was estimated to be 17.67% over their water bill, which is equivalent to 10.64 Euro (Genius, Hatzaki, et al., 2008); Fujita, Fujii, et al. (2005) found WTP for the residents of Iquitos City to approximately be twice of their current average payment level while their ATP was roughly in the range from 10% - 20% lower to 20% higher than their current average payment level; Whittington, Lauria, et al. (1991) reported the high willingness of the households in Onitsha to pay more for improved water services.

2.11 Conceptual Framework

In order to assess the financial sustainability of drinking water kiosks system in Zambia, two variables need to be investigated and these are the financial aspects and the institutional and legal framework aspects of the water kiosks systems. The financial aspects shall include assessing the ability of the water kiosk system to be able to recoup in the medium and long term the construction and or investment cost as well as operation and maintenance costs

through user fees. The other variable related to the financial aspects of the water kiosk is the price and or tariff of the water. Closely linked to the price paid for the water is the willingness and affordability to pay which are generally determined by among other things the household income levels of the beneficiary group. Ultimately, the tariff system of the kiosk drinking water will determine the levels of financial sustainability, at the same time it will also reveal the nature of subsidies, if any, incorporated in the price of the water. Whilst subsidies are a way of ensuring social equity of the service, they have a very high potential of distorting the market thereby leading to high negative externalities and failure of the markets. Other factors having direct negative impacts on the financial sustainability of the kiosk system include the availability of alternative sources of water supply as well as the location of the water kiosk relative to the households. The reliability of the supply at the kiosks will equally contribute to would be beneficiaries seeking alternative sources of water supply. Figure 1 presents the general framework for this study.

Figure 1: Conceptual framework



Source: Author's elaboration (2012)

Similarly, the price of the water paid will depend on the tariff structure and this will mainly be determined whether or not the full economic price is used but complimented with subsidies.

Chapter 3: Description of the Study Area

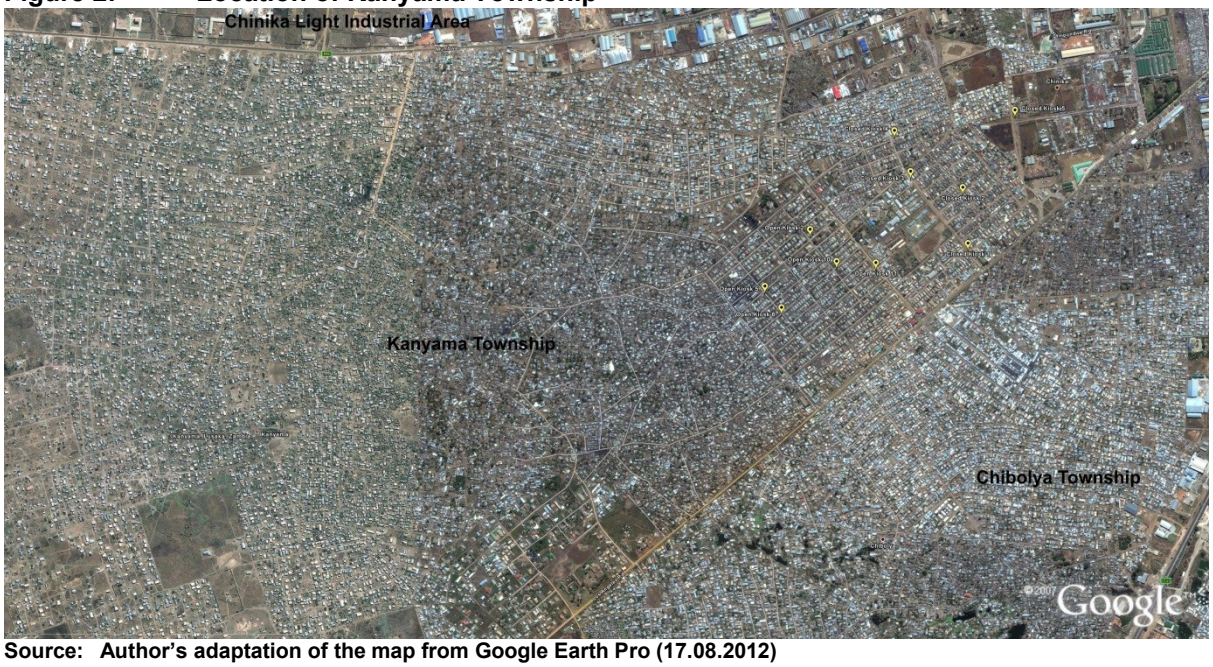
3.1 Introduction

The general physical and socio-economic demographic setup of Kanyama Township, the focus of this study is described in this section. The water supply system set-up in the township is also described.

3.2 Development of Kanyama Township

Kanyama Township is one of the 33 peri-urban areas located in the City of Lusaka. It covers the area immediate to the southwest of the City, covering a total area of approximately 75.63 km^2 and it borders with Chibolya Township in the southeast; the Central Business District (CBD) in the northeast and the Chinika Light Industrial Area in the north (see figure 2). This calculation of the area coverage is based on CSO (2011b) population density of Lusaka of 4,841 persons per km^2. Los Angeles road forms the boundary between Kanyama and Chibolya townships while Mumbwa road in the north divides Kanyam Township with the Chinika Light Industrial Area.

Figure 2: Location of Kanyama Township



Source: Author's adaptation of the map from Google Earth Pro (17.08.2012)

Kanyama Township, like all peri-urban areas in the City of Lusaka, was originally an agricultural land -- a farming area prior to the country's independence in 1964.

Three (3) distinct areas define the development of the township, namely; Old Kanyama, New Kanyama and Kanyama Extension and Site and Service.

Old Kanyama was the first settlement to be established in Kanyama Township. However, influx of the people migrating from rural parts of Zambia into towns and cities in search of job opportunities resulted into the population explosion of the then Old Kanyama settlement further encroachment of new areas by these illegal settlers. Consequently, New Kanyama and Kanyama Extension and Site and Service were opened up. It was not until the 1990's when Kanyama Township was legalised. Today, Kanyama Township is a Constituency consist of three (3) wards, namely Kanyama; Harry Mwanga Nkumbula and Munkolo wards (see table 4). Kanyama Township has a population of 366,170 people and 78,995

households (CSO, 2011b). Wards are the lowest political administrative tier, followed by a constituency, a district, a province and then the nation.

Table 4: Population distribution of Kanyama Constituency Categorizing water supply

Ward name	Households	Male	Female	Total
Kanyama	36,834	84,102	85,196	169,298
Harry Mwaanga Nkumbula	35,989	81,696	84,724	166,420
Munkolo	6,172	15,082	15,370	30,452
Constituency Total	**78,995**	**180,880**	**185,290**	**366,170**

Source: (CSO, 2011b)

As a result of its historical establishment -- starting as an illegal settlement -- Kanyama Township lags behind in general development. Service infrastructure like water network system is limited to certain localities and its expansion has been impeded. Area plans are up-hazard and almost all the land is in private hands (individual land lords). Even the land that is supposed to be for public reserve is encroached on and effectively turned into private land. This, coupled with the poor state of the housing units makes it difficult to extend the water distribution network system to houses to facilitate individual yard connections. Nonetheless, some houses in New Kanyama and Kanyama Extension and Site and Service have individual household connections but the majority of the population do not have access to such facilities.

3.3 Socio-economic status of Kanyama Township

According to (CSO, 2011a) 40.6% of the population were paid employees and 16.8% were unemployed with the rest being economically inactive. Furthermore, 58.3% of population in employment was in informal sector. Household monthly income ranged from ZMK 50,000 to over ZMK 1,200,000. The monthly household income for 12.9% of the people in Lusaka was found to be between ZMK 50,000 and ZMK 300,000 while 40.6% of the people had household income of more than ZMK 1,200,000 per month, with 46.5% of the people having the monthly household income of between ZMK 301,000 and ZMK 1,200,000.

Out of the average monthly household expenditure in Lusaka approximately 35% was spent on foods while 65% was spent on non-foods. The average per capita expenditure was calculated to be approximately 25%. Nonetheless, the median of the monthly household average expenditure was established to be ZMK 523,392 with the monthly household average per capita expenditure working out to be ZMK 131,073 (CSO, 2011a).

3.4 Water Supply System in Kanyama Township

Kanyama Township has a mixed system of water supply. This mix water supply comprises: 1) individual household connections; 2) stand pipes, and 3) water kiosks.

In principle, the water supply is the responsibility of the Lusaka Water and Sewage Company. The National Water and Sanitation Act No Act No. 28 of 1997 mandates the CUs to supply water and provide sanitation services to urban areas (The Water Supply and Sanitation Act, 1997). However, there are two institutions in Kanyama Township that are supplying water and these are the Kanyama Water Trust and the LWSC. The Kanyama Water Trust manages the water supply system constructed by CARE International Zambia, an international NGO, which has since been passed on to the community. Nonetheless, the Kanyama Water Trust is closely monitored by LWSC. A memorandum of understanding (MoU) which is called the Management Service Contract (MSC) has been entered into by the two organizations. The MSC legally recognises Kanyama Water Trust as provider of water for a specified area of the township and in turn reports to LWSC. In addition, NWASCO regulates the Trust (Kanyama Water Trust) through LWSC. The Trust has its own

independent management structure for its operations with its supreme management organ being the Board of Trustees. The Board of Trustees has representation from LWSC, Lusaka City Council and members of the community. Water is supplied through water kiosks as well as stand pipes.

Water to the other areas not covered by the Trust is supplied by LWSC using either individual household connections and or water kiosks. The operations of the kiosks are managed by the Peri Urban Department. This department is headed by a Manager -- Manager Peri Urban -- and each of the three (3) peri-urban zones has a head who in turn is assisted by a superintendent; technicians, and cashiers.

Water kiosks are centralised water supply points providing safe and clean water supplies to the community. Two (2) kinds of water kiosks are operated by LWSC in Kanyama Township, namely the closed water kiosks and the open water kiosks (see figure 5 (a) and (b)).

Figure 3: Types of water kiosks operated by LWSC in Kanyama Township

(a) Open kiosk system

(b) Closed water kiosk
Source: Author's field study findings (2012)

A total of 18 water kiosks are operated by LWSC in Kanyama Township, five (5) of which are closed kiosks while 13 are open kiosks. All the closed water kiosks are located within Kanyama Extension and Site and Service with the rest being spread between New Kanyama and Old Kanyama. Figure 4 shows the locations of the 10 water kiosks studied for this research.

Figure 4: Location of the 10 water kiosks studied

Source: Author's adaptation of the map from Google Earth Pro (07.08.2012)

Yellow markers indicate the location of the 10 water kiosks surveyed. The kiosks were mapped on Google Earth Pro map using the coordinates collected for each water kiosk using a Global Positioning System (GPS). A Garmin GPSMAP 60CSx was used for mapping the coordinates. The coordinates were mapped in decimal degrees (hddd.ddddd°) and the WGS 84 datum was used. Table 5 presents the coordinates of the 10 studied water kiosks.

Table 5: GPS coordinates of the 10 studied water kiosks

Kiosk name	Coordinates (hddd.ddddd°)	
	Southing	Easting
Closed kiosk 1	15.42952	028.26500
Closed kiosk 2	15.42726	028.26478
Closed kiosk 3	15.42661	028.26259
Closed kiosk 4	15.42496	028.26191
Closed kiosk 5	15.42413	028.26697
Open kiosk 2	15.42896	028.25837
Open kiosk 5	15.43126	028.25647
Open kiosk 6	15.43212	028.25717
Open kiosk 10	15.43025	028.25948
Open kiosk 11	15.43031	028.26113

Source: Author's field study findings (2012)

Each water kiosk is equipped with a pre-paid meter and has at least two (2) outlet taps. Water to the kiosks is supplied through the City's main water supply network system, and all the infrastructures of the water kiosk system is owned by LWSC and are thus maintained by the CU through the superintendent and a team of technicians.

Nonetheless, the day to day dispensing of the water at the kiosk is done by the water vendors who are engaged by LWSC through a contract to primarily sell water from the kiosks and remit the sales to the CU. This contract outlines the terms and conditions of engagement as a water vendors, on one hand, as well as the responsibilities of the utility, on the other hand.

A water vendor is remunerated on a commission basis and this commission is calculated based on the water sales made per each period. This period is usually a month. Therefore, the water is a commodity for LWSC and is sold by vendors on their behalf.

Chapter 4: Research methodology

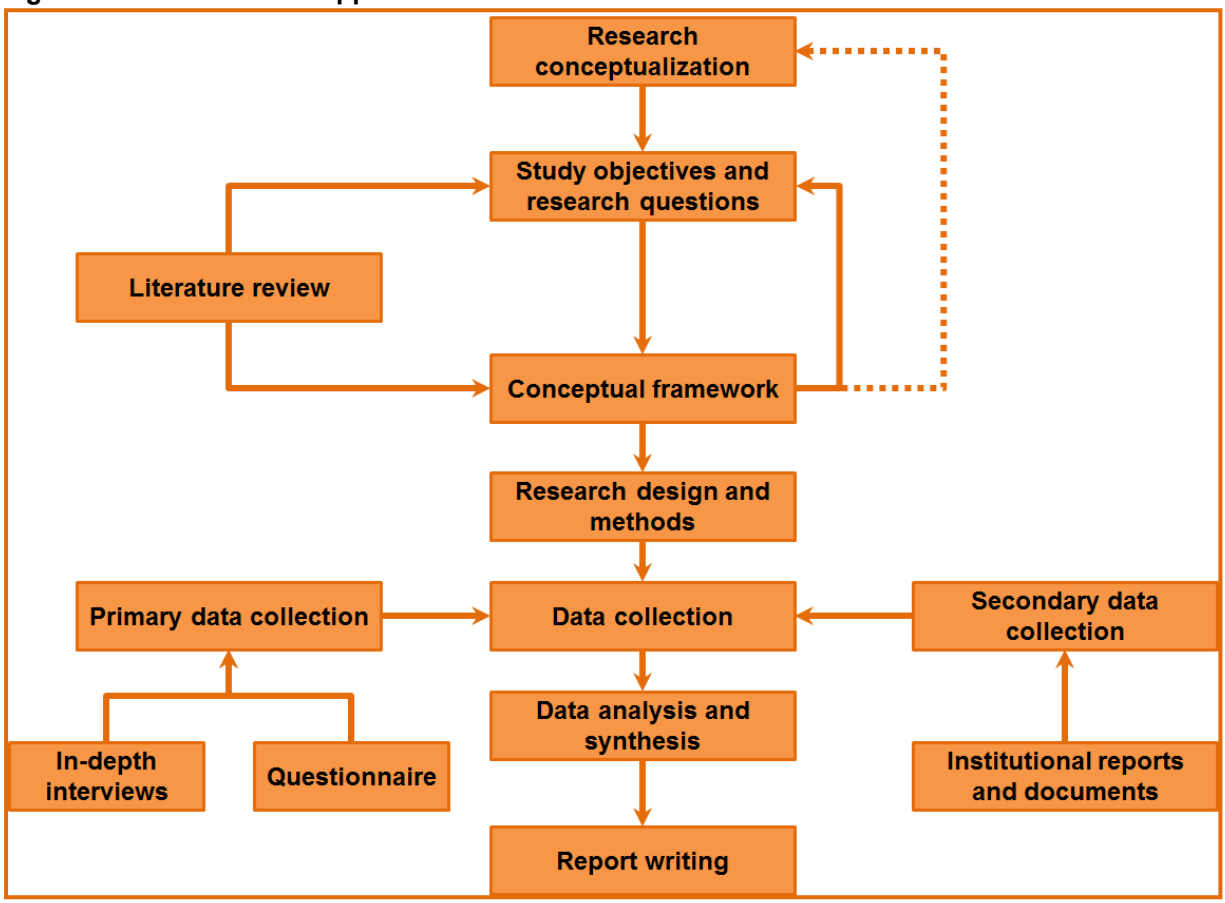
4.1 Introduction

This chapter describes the research techniques and approaches used in the study. The chapter further presents the sample size and sample selection criteria as well as the tools used for data collection and analyses. Limitations for the study are also highlighted and presented.

4.2 Research Type and Strategy

The type of the research undertaken was exploratory and the strategy was a survey. This was primarily because the study was aimed at both exploring the water kiosks system in Zambia, and particularly in Kanyama Township, as well as analysing its sustainability, from the financial point of view. The survey took both the forms of a questionnaire and interview. Figure 5 is a summary of the study approach.

Figure 5: Research approach



Source: Author's elaboration (2012)

Central to the research development was the conceptualization of the study idea which included the study title, objective and research questions. The formulation of these aspects of the research guided the literature review component. Importantly, the literature review component provided valuable input into the general perspective and rationale of the research, as well as providing critical insight in broadening the understanding of the subject area, leading to the development of the conceptual framework (see figure 1).

The conceptual framework provided the basis onto which the research methods and tools were developed. Data and information was collected using these research tools developed, and consequently analysed and synthesized. The results of the analysis and synthesis of the data and information collected are presented in Chapter 5 while the conclusions are presented in Chapter 6 of this report.

4.3 Data Collection Methods

Two types of data sets, namely primary data and secondary data were collected in this study. Primary data was collected through the use of in-depth interviews and questionnaires while secondary data was collected through the review of literature, reports and documents.

4.3.1 Secondary data

Secondary data constituted the data from the review of literature as well as the data obtained from the review of reports and documents. The reports and documents were obtained from the Lusaka Water and Sewage Company (LWSC); National Water and Sanitation Council (NWASCO) and Devolution Trust Fund (DTF).

4.3.2 Primary data

Structured in-depth interviews and questionnaires were the survey tools used to collect primary data. Questionnaires were administered on households while in-depth interviews were administered on water kiosks vendors, LWSC, NWASCO and DTF. Household questionnaires were fundamentally semi-closed ended type.

4.3.3 Sampling

Respondents were clustered into three (3) groups namely: institutions and organizations; water kiosk vendors, and households.

The three (3) institutions and organizations namely LWSC, NWASCO and DTF were purposively selected and so were the water kiosks vendors. The water kiosks vendors were selected using snowball sampling technique. A total of 10 kiosk vendors out of the 18 water kiosks operated by LWSC in Kanyama Township were scheduled to be interviewed but only six (6) were actualized.

Nonetheless, the third cluster of the respondents, the households, was randomly selected from amongst the households collecting water from each of the 10 water kiosks surveyed. Each household that participated in the study were selected after every-other house along the same street until the 12th household was sampled. The starting household to be interviewed was always selected from the houses nearest the water kiosk. Table 6 is the summary of the study sample and selection criteria used in the study.

Table 6: Sample size and selection technique

Respondent	Sampling technique	Sample size	Actualized sample size
National Water and Sanitation Council	Purposive	1	1
Devolution Trust Fund	Purposive	1	1
Lusaka Water and Sewage Company	Purposive	1	1
Water kiosk vendors	Snowball	10	6
Households	Random	120	120
Total sample population		**133**	**129**

Source: Author's elaboration (2012)

Therefore, three (3) sets of research instruments were developed (see Annex 1) and administered on three (3) classes of respondents, namely: i) households; ii) water kiosk vendors, and iii) representatives of LWSC, NWASCO and DTF. Interview schedules were used in the one-to-one structured in-depth interviews with representatives of NWASCO, DTF and LWSC as well as the water kiosk vendors. A semi-closed ended questionnaire was used for collecting data from the households. All the survey instruments were interviewer-administered. Five (5) research assistants administered the household questionnaire while the in-depth interviews were administered by the author. The research assistants were trained during a half-day training session held on July 9th 2012.

Structured in-depth interviews
A total of nine (9) numbers of in-depth interviews were conducted for this study. Out of these nine (9) numbers of in-depth interviews, six (6) numbers were kiosk vendors and one interview each from representatives of LWSC, NWASCO and DTF. Only three (3) of these in-depth interviews were recorded using a digital-voice recorder, namely interviews from LWSC, DTF and NWASCO. The Manager Peri Urban Department was the officer interviewed from LWSC while the Engineer and Chief Inspector were the officers interviewed from DTF and NWASCO, respectively. These interviews were administered between July 11th, 2012 and July 30th, 2012. Copies of interview guides are attached as Annex 1A and 1B.

Household questionnaires
A total 120 semi-closed ended questionnaires were administered to the households in the study area. The would-be respondents (households) were defined by the extent of the boundary (catchment area) of the respective water kiosks studied. A total of 12 households were interviewed per water kiosk. The household questionnaires were administered on July 11th, 2012 (see Annex 1C for a copy of the household questionnaire).

Limitations and justification
The main limitation being envisaged for the study is the time constraint. The allocated time period of four (4) weeks for the field work was not adequate to undertake a pilot study to test the reliability particularly of the household questionnaire. Therefore, in order to minimize the instrument errors, the household questionnaire was mainly based on questions adapted from similar studies that have been undertaken, particularly the (USAID, 1988). In addition, to adapting the household questionnaire on the already published tools, extensive peer reviews of the survey instruments were undertaken.

Four (4) out of the 10 water kiosks vendors could not be interviewed partly because of the lack of time. On all the occasions visits were made to the township, these four kiosks were not operating and hence it was difficult to locate the kiosk vendors as they were staying in different parts of the township and not close to the water kiosks.

Interview with LWSC only took place on July 30th 2012, a day before the author's scheduled flight back to school. This consequently jeopardized the planned random sampling of the water kiosks to be studied since prior information such as the names of the water kiosks that was critical for the random draw. Therefore in the absence of this information, the water kiosks that were eventually studied were selected based on the information passed on from their contemporaries which primarily was the *'name and the location of the next water kiosk'*. In addition, the discovery that there were only five closed kiosks in Kanyama Township and the desire to collect information from all the five further made the initial plan of studying the water kiosks based on randomly drawn technique distant.

4.4 Data Analysis Methods

The quantitative data which was collected using the structured semi-closed ended household questionnaire were analysed using percentages; means; frequency distributions; median; mode, and range. Due to the relatively large quantity of data that was collected, SPSS programme was used to analyse the data collected using a household questionnaire. Qualitative data collected using interview schedules and open-ended questions were coded, ranked and described. All the in-depth interviews were transcribed prior to analysing. Classes and the frequency table containing the clustered responses were generated. In addition, phrases and or responses of interest were highlighted and described.

Information obtained from reports and documents (secondary data) will be synthesized with the primary data and principally used as the basis for inferences. The analyzed data will be presented in summary tables and graphs.

4.5 Units of Analysis, Variables and Indicators

In this study the main unit of analysis was the water kiosk. The subunits of analysis in this study were the household who were the consumers of the services provided by the kiosk water; the water kiosk vendors who were responsible for the day to day dispensing of the water at the kiosks; the LWSC who were the CU responsible for supplying water and providing sanitation services in the City of Lusaka and consequently the owners of the water kiosks. In addition, other subunits of analysis were NWASCO, the regulators of the urban water supply and sanitation. Furthermore, the roles of the DTF helped in providing the understanding into the financial sustainability of the water kiosk system since they were responsible for providing the finances for the construction of such water schemes.

Variable and indicators are presented in table 7. Figure 6 presents the conceptual model of the research, the basis upon which the study was built.

Table 7: Research question, concepts, variables and main survey questions

Research question	Concept	Variable	Indicator	Main survey questions
Does the cost and financing arrangements of the water kiosks guarantee long-term sustainability? What institutional organization and legal framework are in place?	Cost and financing arrangement	1. Construction cost 2. Sources of funds 3. Conditions for the access of the funding	• Total cost for water kiosk construction • Sources of water and hook-up charges • Conditions for servicing the 'loan'	• What is the cost of constructing a water kiosk? • How is this cost financed? • What is the source for water for the kiosks?
	Long-term sustainability		• Construction costs locally financed	• What is the contribution of the Government of Zambia to these finances?
	Demographic conditions	1. Household size	• Numbers of family members	• What is the size of the family?
	Socio-economic conditions	1. Household income status 2. Household form of employment 3. Household expenditure	• National minimum wage • Monthly household income • Monthly household expenditure	• What is the range of your monthly income? • Where do you work? • What is your monthly household expenditure?

Source: Author's elaboration (2012)

Table 7: Research question, concepts, variables and main survey questions (Cont'd)

Research question	Concept	Variable	Indicator	Main survey questions
Does the price of water reflect the investment, operation and maintenance costs?	Water tariff	1. Kiosk water unit cost 2. Cost of Kiosk water per volume consumed	• Tariff charged on the 1st block of the LWSC RBT	• What is the tariff of kiosk water? • What costs does it cover? • How is this tariff calculated?
	Full cost recovery	1. Investment cost 2. O&M cost 3. Opportunity cost 4. Environmental cost	• Tariff charged on the last block of the LWSC RBT -- maximum tariff for higher consumption	• What % of the tariff is investment cost? • What % is O&M? • What % are other costs?
	Subsidy	1. Kiosk water unit cost 2. Kiosk water cost per volume consumed	• Tariff charged on the 1st block of the LWSC RBT	• Is the kiosk water subsidized? • What is its full economic cost?
Are the customers satisfied with the water kiosk services? Are they willing to pay more for improved services like household connections?	Customer satisfaction	1. Household monthly water uses 2. Household monthly water expenditure 3. Time spent on queue of water 4. Types of water sources of water 5. Distance to the nearest water kiosk 6. Cost household willing to pay for individual household connections 7. Total monthly household income 8. Total monthly household expenditure 9. Adequacy of income	• Quality for different uses • Quantities for different uses • Amount willing to pay for household connection • Amount charged for the 1st block of water (LWSC RBT) • Minimum water basic need standards • Percent of the net monthly household income spent on water • Net household monthly earnings	• How satisfied are you with the services provided by the water kiosk? • How satisfied are you with the quality of water provided by the water kiosk? • How satisfied are you with the quantity of water provided by the water kiosk? • How satisfied are you with the amount paid for the water from the kiosk? • How satisfied are you with the structure of the water kiosk? • Where does your household get water from? • How much water do you use every day? • How much do you spend on water each month? • How much are you willing to pay if you have a household connection?
	Affordability to pay (ATP) for the improved services			
	Willingness to pay (WTP) for the improved services			

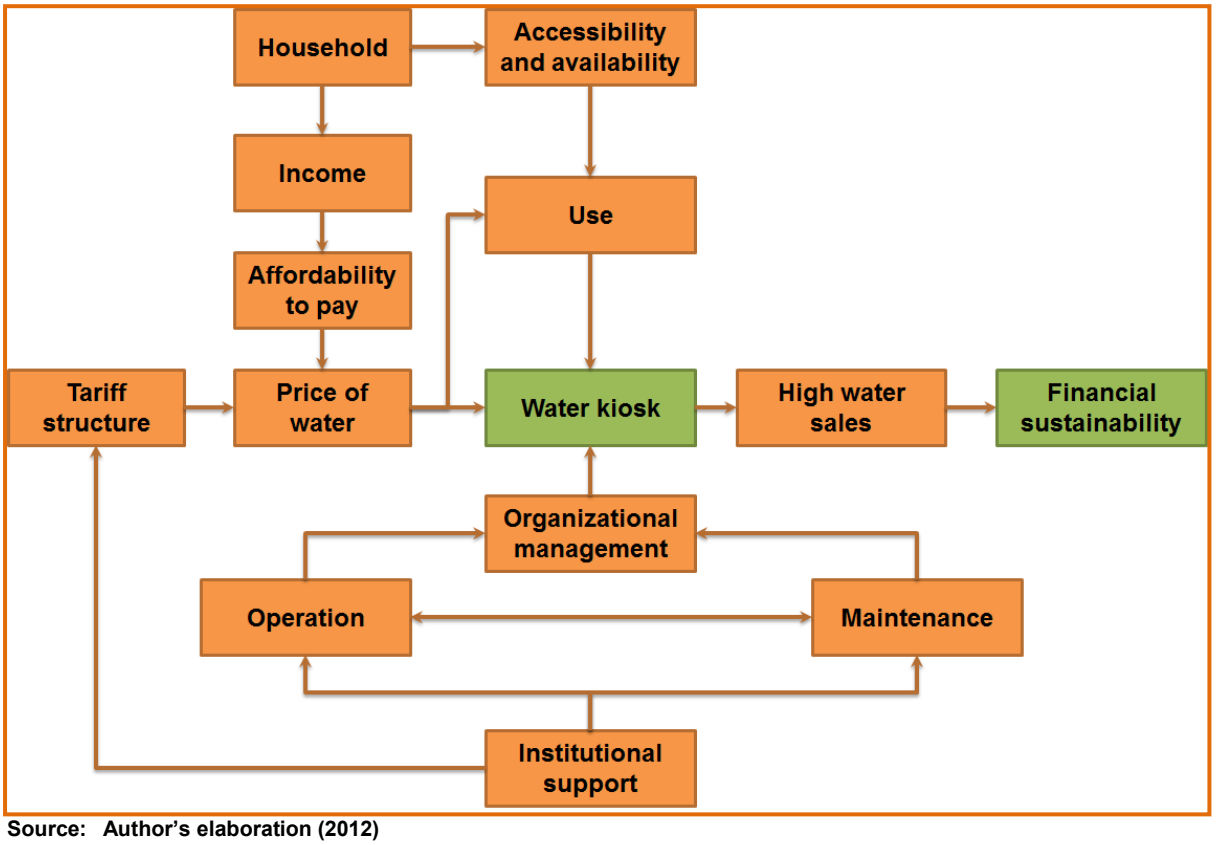
Source: Author's elaboration (2012)

Table 7: Research question, concepts, variables and main survey questions (Cont'd)

Research question	Concept	Variable	Indicator	Main survey questions
Are the customers satisfied with the water kiosk services? Are they willing to pay more for improved services like household connections?	Willingness to pay (WTP) for the improved services			• If the price you are charged is ZMK 500 per drum for individual connection, would you like to have a household connection? • If the price you are charged is ZMK 1000 per drum for individual connection, would you like to have a household connection? • If the price you are charged is ZMK 750 per drum for individual connection, would you like to have a household connection? • If the price you are charged is ZMK 450 per drum for individual connection, would you like to have a household connection?

Source: Author's elaboration (2012)

Figure 6: Study conceptual model



Source: Author's elaboration (2012)

Chapter 5: Research results and analysis

5.1 Introduction

This chapter presents the findings of the study. The findings are presented under the three (3) research questions, namely: 1) Does the cost and financing arrangements of the water kiosks guarantee long-term sustainability? What institutional organization and legal frameworks are in place? 2) Does the price of water reflect the investment, operation and maintenance costs? 3) Are the customers satisfied with the water kiosk services? Are they willing to pay more for improved services like household connections?

Research questions 1 and 2 were answered through in-depth interviews, three of these being institutions (NWASCO, DTF and LWSC) and six (6) being water kiosk vendors, while research question 3 was answered through a semi-closed ended household questionnaire. Therefore, three separate research instruments were used in this study -- one for the institutions, another one for the water kiosk vendors and the other one for water kiosk service end-users (households). Transcripts of the interviews with institutions are attached as Annex 2.

5.2 Costs and Financing Arrangements of Water Kiosks and their Institutional Organization and Legal Framework

The Kanyama Township water kiosk scheme was exclusively financed through the pro-poor basket fund, the Devolution Trust Fund (DTF). The financing agreement was a grant system. A total of ZMK 1.1 Billion was spent on the project. Table 8 summarises the findings about the costs and financing agreement of the Kanyama Township water kiosk system.

Table 8: Costs and financing arrangements

Question	Summary of answers given by the three institutions
What was the total cost for construction of 18 kiosks in Kanyama Township?	Average cost of the kiosk at that time was about ZMK 5,000,000 for the open type per kiosk then the closed type was ZMK 15,000,000
	The total project cost for Kanyama was about ZMK 1.1 Billion that is inclusive of the entire infrastructure
	This one, I think they can give you when you go to Lusaka Water. I can have the unit cost but I think they will give you more details on this one
How is the construction of the kiosk financed? What are the sources of these finances?	Sometimes the financing is from LWSC own budget. But also if we get a grant for instance, as the case was with Kanyama with a grant from DTF, we build the cost of that into the proposal we submitted to DTF
	What we do is, we actually first issue what we call as 'A Call for Proposal'. This is a window where the CUs are allowed to apply for money from the DTF. The CUs then apply for financing of areas of their preference. We have our basket fund partners. These are the KfW, DANIDA, EU, AusAID, Zambian Government and technical support from GIZ
	So, there are also NGOs apart from the Devolution Trust Fund
What is your organization's contribution to the total investment cost of these kiosks?	That was done under the grant from DTF. The company's contribution was mainly through the staff - the staff costs and also on the general social and community sensitization that was borne by the company but infrastructure was covered through the grant
	DTF financed the whole Kanyama Township water Project
	No contribution that we made apart from housing the Devolution Trust Fund

Source: Author's research findings data analysis (2012) **N=3**

Table 8: Costs and financing arrangements (Cont'd)

Question	Summary of answers given by the three institutions
What is the total contribution of the Government of Zambia to these finances?	That I would not know exactly because what they do is finance the Devolution Trust Fund. So government has its budget allocated for that but also other donors that are interested in the sector also finance the DTF...
	Government support to the DTF comes in form of counterpart funding to the financing agreements signed with our DFTs - basket fund partners. We also present budgets at the beginning of the year…So, two components: counterpart funding and through normal budget support. Counterpart funding may be anything but not more than 25%
	Okay, this one I can get it from the DTF. I do not know but it could be 5% or less but I can get that from DTF. I can give you that. It should be less than 5%

Source: Author's research findings data analysis (2012) **N=3**

Depending on the type of financing agreement, the Zambian Government (GRZ) provides counterpart funding as agreed upon with the respective DTF basket fund partner and may range from as low as 1% to as much as 25%. At present, there are a total of six (6) basket fund partners and these are the KfW, DANIDA, EU, AusAID, GRZ and technical support from GIZ. But according to Eberhard (2011) to date the Government's contribution to the basket fund is just about 3% of the funds. This, nevertheless, is the main financing support of GRZ to the DTF although it also provides the Fund with normal budget support.

Even if there are neither regulatory nor legal frameworks, ordinarily, supporting the functioning and establishment of the water kiosk system, DTF is a function of the regulatory and legal framework. In addition, there are standards, regulations and legislations on the quality of drinking water as well as the service guarantee. There is a legal requirement for service guarantee, i.e. how much time someone should have access to full water supply. These are enforced by the Regulator, NWASCO (see also table 9 which presents the responses on institutional organisation and legal framework).

It is, therefore clear that there are no specific regulations and legislations controlling the establishment and operation of the water kiosks. However, regulations and legislations governing the operations and functioning of the water kiosk system, that directly apply to the commercial utility (CU) are implied on the water kiosk system particularly by virtue of the fact that Kanyama water kiosk system is a sub-function of LWSC. The quality of water supplied is regulated and enforced by the NWASCO and so are the tariffs and service guarantees. Both, the tariff and service guarantees, are approved by the NWASCO. In addition, NWASCO further enforces the minimum basic consumption requirements, although subtly.

The financing mechanism (DTF) that has been developed has a lot of positive characteristics of encouraging the CUs improve access to water in poor urban and peri-urban areas as it allows CUs to extend access to these areas while maintaining their balance sheets positive. CUs need such financial support if they have to continue operating as commercially viable utilities. But the downside is that the functioning of this financing mechanism depends on cooperating partners to provide finances to fund the various projects. Thus, the over-dependency of DTF on cooperating partners to provide finances for project implementation, in my opinion, is not sustainable mainly because priorities of cooperating partners change over time and consequently this affects their areas of support and financing. A case in point is DANIDA who has been a historical Fund partner but is pulling out by the end of 2013. The Danish Government is phasing out development assistance to a more direct business engagement of traditional trade cooperation. A situation where DTF will lose all its current basket fund partners is not improbable. Therefore, a much more sustainable way to support the basket fund needs to be developed. A system based on locally available resources always proves to be a long-term sustainable option.

It has to be noted that the unit cost of constructing a closed water kiosk is almost 3 times higher than that of constructing an open kiosk. This is expected as closed kiosks are designed to be vandal-proof at the same time to be used as small grocery stores. Vandalism is widespread in poor urban and peri-urban areas and, such facilities may not serve their purpose since they could likely be vandalized almost immediately. Furthermore, comfort of the water vendor is an important element of the success and or failure of the water kiosk system. Closed water kiosks provide the needed protection from seasonal weather changes and this guarantees the availability of the supply to the community. But, the potential of kiosks as small business hubs need be fully exploited. None of the closed water kiosks were being used as grocery stores. Therefore, equal efforts need to be invested in business planning for water kiosks if their use as a small business hubs as to be realized.

Table 9: Institutional organisation and legal framework

Question	Summary of answers given by the three institutions
How is the ownership of the water kiosk in Kanyama Township structured?	The infrastructure itself where the pipes are and where to control water is owned by Lusaka Water and Sewage. But usually constructed on land that is negotiated with owners or people nearest the infrastructure
	The kiosks are actually owned by the water company, the water utility. The money which the DTF gives to water company is grant and there are actually on the asset book of the water company
	LWSC has a manager in Kanyama. This manager reports to the Head of the Peri-Urban Unit who in turn reports the highest office - the Chief Executive
What are your roles in the water kiosk system?	Supplying the water; holding the election of the water vendor who we elect from the community; collecting sales from the vendor, and accounting for the water that is used. Also do maintenance of the kiosk. The vendor is paid commission for selling water on behalf of the utility
	Our role is to assist CUs improve service delivery in low income areas. We are purely a basket fund financing water supply and sanitation projects for the low income area
	That Devolution Trust Fund was set up by NWASCO. According to the National Water and Sanitation Act, we were asked to come up with a basket fund and this basket fund is now what we are calling as the DTF
What management system has been instituted for these water kiosks?	The ones we have in Kanyama are managed by Lusaka Water and Sewage directly. The Peri-Urban Department is split into three different commercial zones based on geography. Kanyama falls in the peri-urban south. That particular zone has a head who is a community development person and then we have a crucial person who is a technical superintendent, a couple of plumbers and some people dealing with billing - they do not deal with Kanyama only but they are responsible for the whole peri-urban south zone
	There is a requirement; it is a prerequisite to providing funding that a CU should form a Per-Urban Unit, to be responsible for managing the water supply scheme
What regulatory framework is in place for water kiosks and what does it entail?	The Regulator just regulates the tariffs that apply. They also encourage us to open the kiosks for as long as possible in terms of opening hours...
	There is no regulation per say because a kiosk is just like a standpipe except that it is much more developed to try and improve the environment from which people are getting water supply; environment for the vendor and now the vendor come rain, come snow, come sunshine the vendor will be in a secure place where they can still sell water
	The same way we regulate any water supply is the same way we regulate the kiosks, except in terms of hours of supply because they can only work from a certain time to a certain time as they cannot be there in the night. So most of the kiosks are guaranteed about 12 hours, and we demand that the minimum should be about 12 hours

Source: Author's research findings data analysis (2012) **N=3**

A peri-urban unit has been established within the LWSC which is called the Peri Urban Department. It is headed by a manager who is responsible for all the three zones and reports directly to the chief executive officer (CEO) of the CU. Each zone has a head and is supported by the superintendent, a group of artisans (plumbers) and cashiers. Water kiosk vendors, on the other hand, although at the bottom of the structure are delinked from the CU as they are just engaged through contracts on behalf of the CU as salespersons, responsible for dispensing water and collecting moneys from such sales as wells as remitting such moneys the CU. Table 10 summarizes the actors, factors, roles and relationships in the Kanyama Township water kiosk system.

Table 10: Actors, factors and roles in water kiosk system

Factors	Actors	Roles
Water kiosk	LWSC	Establishes and manages water kiosks systems
		Establishes peri-urban unit
		Supplies water
		Operates and maintains water kiosks systems
		Engages/ contracts vendors
		Receives sales from water
		Disburses commissions
	NWASCO	Approves and enforces service guarantees
		Enforces water quality standards
	DTF	Mobilizes finances
		Finances water kiosks construction through Imprest Form System
		Provides performance enhancement funds
		Monitors water kiosks operations the first two (2) years
	Community	Contributes vendors
		Approves locations of water kiosks
		Supports water kiosks, i.e. Purchases water from water kiosks
	Water vendor	Dispenses water
		Maintains order and cleans the water kiosk surroundings
		Remits sales
		Acts as a focal point person for hygiene and disease alerts
Tariff	LWSC	Implements tariff
		Displays tariff and service guarantees
		Revises and proposes new tariffs
	NWASCO	Approves tariff
		Issues service guarantees
		Enforces tariff
		Monitors implementation
Water vendor commission	Water vendor	Agrees on the type of the commission to be received
		Receives the commission
	LWSC	Decides on the type of commission to give the water vendor
		Disburses the commission

Source: Author's research findings data analysis (2012) **N=9**

Two types of water kiosks have been constructed in Kanyama Township, namely the closed type (5 No. in total) and the open type (13 No. in total) and they are all equipped with pre-paid meters. Pre-paid metering is a new system which was introduced around July 2011 and has just been operational for just over a year.

Members of the community with pre-paid water tags are able to access water supply as and when the supply is available 24 hours a day from both types of kiosks. The pre-paid water

tags are rechargeable from the local office of the CU within Kanyama Township (see figure 3 for the types of kiosks in Kanyama Township).

5.3 Whether or not the Price of Water Reflects the Investment, Operation and Maintenance Costs

NWASCO, the Regulator, regulates water supply and sanitation services in urban and peri-urban areas in Zambia. Setting of water and sanitation tariff structures and their approval is one of the Regulator's core responsibilities. Therefore, water kiosks tariffs are approved by the Regulator. In general the water tariffs in Zambia are structured around the principle of cross-subsidy as enshrined in the National Water Policy where the higher block users subsidize the lower block users. The water tariffs are a rising block tariff (RBT) with the lowest block being the 0-6 m^3. In principle three (3) types of tariff apply for residential properties; namely low cost (poor and peri urban areas), medium cost and high cost (cf. section 2.5.1). Tariffs for commercial properties are independent of the residential properties.

The tariff for the lowest block, 1st RBT block (0-6 m^3), is actually equal to or less than the cost of providing the service and the majority of the people in poor urban and peri urban areas consume the services within this first block of 0-6 cubic meters. Table 11 gives the responses on the tariff structure of the water kiosk.

Table 11: Tariff structure in place at the water kiosks

Question	Summary of answers given the three institutions
What tariff structure is in place at the water kiosk?	For the water kiosk we just sell water by the bucket, by a 20 litre container that is a standard that we have at a kiosk. And this is basically a regulated price from NWASCO, the Regulator. It is the lowest price of water you can get.
	The tariff structure is actually that the normal tariff structure must apply for the water kiosks just like for any other water supplied to other areas. CUs submit the tariff structure approval to NWASCO. Some CUs have set a structure for kiosks and we are actually not involved in that; it is up to the CU and NWASCO but all are within the minimum band - they are the rising block figures but the kiosk tariff structure is usually in the minimum band
	The actual tariff that is charged is ZMK 50 per 20 litre container of water. It may have been slightly lower than ZMK 50 but because of change and other things you find that they rounded it off to ZMK 50. It is based on the bucket; because for them we have capped them within 0-6 m^3. So, the 0-6 m^3 is what we have converted into that ZMK 50 per 20 litre container. Kanyama Water Trust, there is no cross-subsidy and hence have disputed that if you apply the Lusaka Water tariff you may not be able to cover our own cost; there may not even be any investments. So, for them you find that instead of charging ZMK 50 they are charging ZMK 100 because there is no cross-subsidy. But for Lusaka Water you find that there is cross-subsidy. So, you approve the total cost, how they apportion that is up to them.
What percentage of this tariff represents operational, maintenance and investment costs	There is no investment cost in the tariff. It is all purely to do with operation and maintenance. Whatever is collected there really is for operation and maintenance. The tariff does not allow for infrastructure recapitalization

Source: Author's research findings data analysis (2012) **N=3**

Therefore what has been done, according to the Regulator, is that any quantity of water consumed within 0-6 m^3 RBT is equal or less than the cost of providing the service but is compensated for by those users consuming more of the service. As a result the tariff in the first block is quiet low. A separate tariff is approved for the water kiosk which is even lower than the tariff of the first block.

The tariff does not include any investment costs apart from the operation and maintenance costs -- i.e., the costs of providing the service. The 2012 approved tariff, by the Regulator, for Lusaka Water and Sewage Company (LWSC), for the 1st RBT block (0-6 m^3) is ZMK 2,400 per m^3 while that of the water dispensed through a water kiosks is ZMK 1,250 per m^3, which translates to ZMK 48 and ZMK 25 per 20 litres container, respectively (cf. 2.5.1).

The study, nonetheless, found that the 20 litres container of water was being sold at ZMK 100 at the water kiosks. All the vendors interviewed in Kanyama Township were selling the 20 litres container of water at ZMK 100 while a drum (~200 litres) of water was being sold at the price ranging between ZMK 1,000 and ZMK 1,500. Table 12 summarises the cost of water at the kiosks.

Table 12: Price of water the water kiosks

Question	Summary of answers given by the six water kiosk vendors		
	Volume of container (litres)	Amount charged (ZMK)	Number of response
How much do you charge for water?	20	100	6/6
	200	1000	1/6
		1250	1/6
		1500	4/6

Source: Author's research findings data analysis (2012) **N=6**

A 20 litres container of water is sold at ZMK 100 and this is twice the unit price of the approved RBT 1st block tariff of the City of Lusaka, the 0-6 m^3 whose tariff is ZMK 48 per 20 litres container, and only equals the 5th block (above 170 m^3) whose unit price is ZMK 96 per 20 litres container (LWSC, Undated). This translates to four times the water kiosk approved tariff of ZMK 1,250 per m^3 or ZMK 25 per 20 litres container and yet the users find this normal. It is therefore clear that the end users are paying very high prices for water at the kiosks. It has to be remembered that all the water sales from the kiosks are remitted to the CU.

The tariffs being charged at water kiosks in Kanyama Township fall within the US$0.40-US$1.00 per m^3 and hence are high enough not only to cover O&M costs but also some capital investments costs. GWI (2004) as cited by Komives, Foster, et al. (2005) found that the water tariffs within the range of US$0.40-US$1.00 can cover both O&M costs as well as some capital costs. The cost of water at the water kiosks in Kanyama Township is ZMK 5,000 per m^3 which is just slightly above the US$0.40-US$1.00 upper range.

5.3.1 Operation and maintenance

The water kiosk infrastructure including the water supply and distribution network system are a property of the LWSC and as such the responsibility of operation and maintenance (O&M) is taken up by the CU. A team of technicians headed by a superintendent is responsible for the maintenance of the kiosk infrastructure (see table 13).

Sources of income for O&M are the water sales from the water kiosks. The money from the sale of water from the water kiosk is remitted by the water vendor to the CU and consequently used for payment of the vendor commissions (operations) as well as the general maintenance of the infrastructure. All the vendors interviewed reported that they used the money collected from water sales to buy more water. Vendors are paid on commission (40%) calculated on the volumes of sales made in a particular month.

There is no defined standard norm in terms of the time it will take to repair any specific damage. Repair generally depends on the nature of the damage as well as the knowledge of such a fault by the CU. Nonetheless, the standard norms of operations of a water kiosk are

the opening and closing hours as well as the keeping of the kiosk environment clean. The water kiosk essentially is supposed to remain open throughout the day.

Table 13: Operation and maintenance

Question	Summary of answers given by the three institutions
What is done with the money realized from the sale of water from the kiosks?	That is the same money that vendors' commissions are paid out from. So the vendors get about 40% of what they collect. But whatever money that is collected on daily basis is remitted to Lusaka Water and that is the same money that goes back into the general O&M of infrastructure
	It goes through the central treasury of the CU. The money is just like any other money the CU collects from the sale of water to any other customer. So it goes into the central treasury. That is why we also insist that the kiosk billing system must also be embedded into the CU's main billing system to allow for efficiency monitoring and so on so that it is just part of the overall billing system of the company
What types of payments are given to water vendors? What is the payment based on? How frequent is such payment?	It is a commission basis - 40%. They just collect 40% of whatever moneys they have collected. Every after 30 days
	There is a commission system which is dependent on the water sold; the contract allows the CU to pay the vendor on commission, on an agreed percentage
	Paid on commission basis, ranging from 30-40%
What problems do you face with day to day operation of the kiosk?	In Kanyama, the major problem we have is the power outage. When we have no power it means that we have no power at the production wells; means that the community also ends up not having water. So, we have reduced sales - that affects both our selves but also the vendors because at the end of the month they have reduced income
	Adequate income, security, availability of water supply and maintenace
How is maintenance of water kiosk organised?	That is done by Lusaka Water and Sewage using the superintendent and team. Materials are obtained from the LWSC main supply stores
What are the standards and maintenance norm of the kiosk system?	The opening hours, the standard is to open from 06:00 hours and remain open throughout the day. Nonetheless, they break off by 11:30 hours to 14:00 hours and this time is both for their lunch as well as getting to our local offices to remit the moneys collected the previous afternoon as well as the moneys from the morning sales. In addition, they are supposed to keep the kiosk surrounding and drainage clean and free of any dirt
	Water kiosks should be clean; the kiosks should have a meter and this meter needs to be read regularly - at set intervals of time; register of supplies has to be kept; kiosks should be well maintained; a price (unit cost of water) has to be displayed; kiosk has to be painted. In terms of maintenance you can see that the water is coming from the main city supply line so the maintenance crew has to maintain the water supply network system
What are the monthly average O&M costs of the water kiosk?	Monthly sales of the water from the water kiosks in Kanyama Town averages around ZMK 984,000 per water kiosk while the average maintenance and operation cost is around ZMK 340,000.
What percentage of budget has been set aside for reinvestment (i.e., expansion; improvement of service delivery, etc.) in the water kiosk?	Not necessarily the water kiosk system. I think the budget that we have is we set aside moneys mostly for maintenance, O&M but very small portion to try to carry out small extensions in certain areas. But that is overall, it could be the network but that does necessarily imply that it is reserved for the kiosks only. It varies... but not more than 10%.

Source: Author's research findings data analysis (2012) **N=3**

According to the CU, the major operational problem is the electricity power outage. Electricity power outage affects both the CU and the water vendor. Reduced sales translates to reduced revenue of the CU and reduced income to the water vendors which in the long-

run affects the sustainability of the kiosks because of high turnover of water vendors -- vendors deciding to leave as they are not making any appreciable income. However, the common operational problems identified by the water vendors are summarised in table 14.

Table 14: Major water kiosks operational problems encountered by water vendors

Problem description	Water kiosks encountering the problem
Low water pressure	6/6
Shortage of water	4/6
Erratic water supply	3/6
Pre-paid meter battery problems	2/6
Faults developed by pre-paid meter	2/6
Delays in disbursing commission	5/6

Source: Author's research findings data analysis (2012) **N=6**

The two main operational problems are low water pressure and shortage of water. Low water pressure was reported by all the water vendors, followed by shortage of water supply which was reported by 4 out of 6 water vendors interviewed.

It was observed that all the surveyed water kiosks in Kanyama Township where using one (1) tap for dispensing the water, although open kiosks are designed with two (2) taps and one pre-paid meter while closed kiosks are designed with three (3) taps and two pre-paid meters. It was further observed that the second pre-paid meter had been decommissioned and only one (1) pre-paid meter was in use (see figure 7). Water vendors linked the decommissioning of the second pre-paid meter to the low pressure of water experienced in Kanyama water supply network. Low water pressure is a common problem encountered by all water kiosk venders in Kanyama Township.

On average water kiosks sell up to ZMK 984,000 each per month while the average maintenance and operation cost is around ZMK 340,000 per month. All the vendors interviewed indicated that water sales range between ZMK 15,000 and ZMK 35,000 per day.

Figure 7: Pre-paid meter system

Source: Author's field study findings (2012)

5.4 Customer Satisfaction and Willingness and Affordability to Pay

Data on customer satisfaction was collected using both research tools namely, a semi-closed ended household questionnaire and in-depth interviews schedule for institutions and water kiosk vendors. However, data on willingness and affordability to pay was primarily

collected using a semi-closed ended household questionnaire. The sample population consisted of a total of 120 households and out of which 29 of these respondents were male and 91 were female, representing 24.2% and 75.8%, respectively. Each household on average had 5.18 family members. The number of household members ranged from one (1) to 12 with 26 (21.7%) of these households being headed by a female member and 94 (78.3%) of them being headed by a male member. The average age range of the respondents was 25-35 years age range. Table 15 summarizes the social demographic status of the studied households in Kanyama Township.

Table 15: Social demographic status of studied households in Kanyama Township

Composition of family	Gender of respondents		Gender of household head		Age of respondent		Size of the family	
	Household responses	Percentage	Household responses	Percentage	Household responses	Percentage	Household responses	Percentage
Female	91	75.8	26	21.7				
Male	29	24.2	94	78.3				
Total	**120**	**100.0**	**120**	**100.0**				
18-25					25	20.8		
25-35					46	38.3		
35-45					31	25.8		
Over 45					14	11.7		
Total					**116**	**96.7**		
Missing response					4	3.3		
Total					**120**	**100.0**		
1							7	5.8
2							9	7.5
3							14	11.7
4							24	20.0
5							19	15.8
6							11	9.2
7							14	11.7
8							7	5.8
9							3	2.5
10							6	5.0
11							2	1.7
12							2	1.7
Total							118	98.3
Missing response							2	1.7
Total							**120**	**100.0**

Source: Author's research findings data analysis (2012) **N=120**

5.4.1 Customer satisfaction with the actual provided services

Customer satisfaction was assessed on three levels, namely from the institutions and organizations; water kiosks vendors as well as from individual users of the services provided by the water kiosk (see table 16 for the responses).

It is clear from table 16 that whilst the majority of the end-users are happy with the water kiosk system, the opinion of the institutions (LWSC, DTF and NWASCO) is that of the end-users preferring individual household connection but they are just inhibited by the hooking-up costs. In general, 3 out of the 6 vendors interviewed indicated that the consumers were generally happy with the services provided by the water kiosks. Reasons given for their

satisfaction included: i) Water sold from the kiosk system is relatively affordable by everyone; ii) Water sold is clean and usually chlorinated; iii) Water kiosks are within desirable walking distances; iv) Water kiosks are reliable, and v) The pressure of the water is generally good.

Table 16: Opinion of user on water kiosks

Question	Summary of answers given by the three institutions
What opinions do the locals have on the water kiosk system?	They would prefer to have the connections at their yard, the individual yard connection. But it is just a question of affordability because if they have to have a yard connection then they should be in the position to bear the full cost of laying the network or the pipe up to their yard
	Initially thought we were demeaning their status as they wanted individual connections rather than kiosks. Now people prefer to go to the kiosks because at the kiosk there is reliability, the kiosk will not be closed because maintaining a yard connection is challenging
	They would rather have sinks (taps) in their homes and get water from there
Summary of answers given by water kiosk vendors	
What opinions do the locals have on the water kiosk system?	They are happy. It helps them and it is within desirable distance
	Happy that kiosk is operational and relatively affordable by everyone
	Happy but main complaint is the CUs taking its time to address complaints
	Should revert to old system and not pre-paid. Causes low water pressure
	On my part there is nothing I am told me. You can ask them they are here
	Complain that the pre-paid meter may be the causer of low water pressure

Source: Author's research findings data analysis (2012) **N=9**

On the other hand, the levels of dissatisfaction by the customers were driven by the seemingly reluctance of the commercial utility (CU) in responding to complaints. In addition, frequent water shortages and low water pressure were the other causes of dissatisfaction. It is a commonly held view in some areas that low water pressure was a direct result of pre-paid meter system. These sentiments were strongly echoed by 2 of the 6 water vendors interviewed.

Customer service satisfaction, from an individual point of view, was assessed using five variables, namely: service satisfaction; water quality satisfaction; water quantity satisfaction; tariffs satisfaction, and water kiosk structure satisfactions (see table 17 and figure 8).

Table 17: Customer satisfaction with water kiosk system

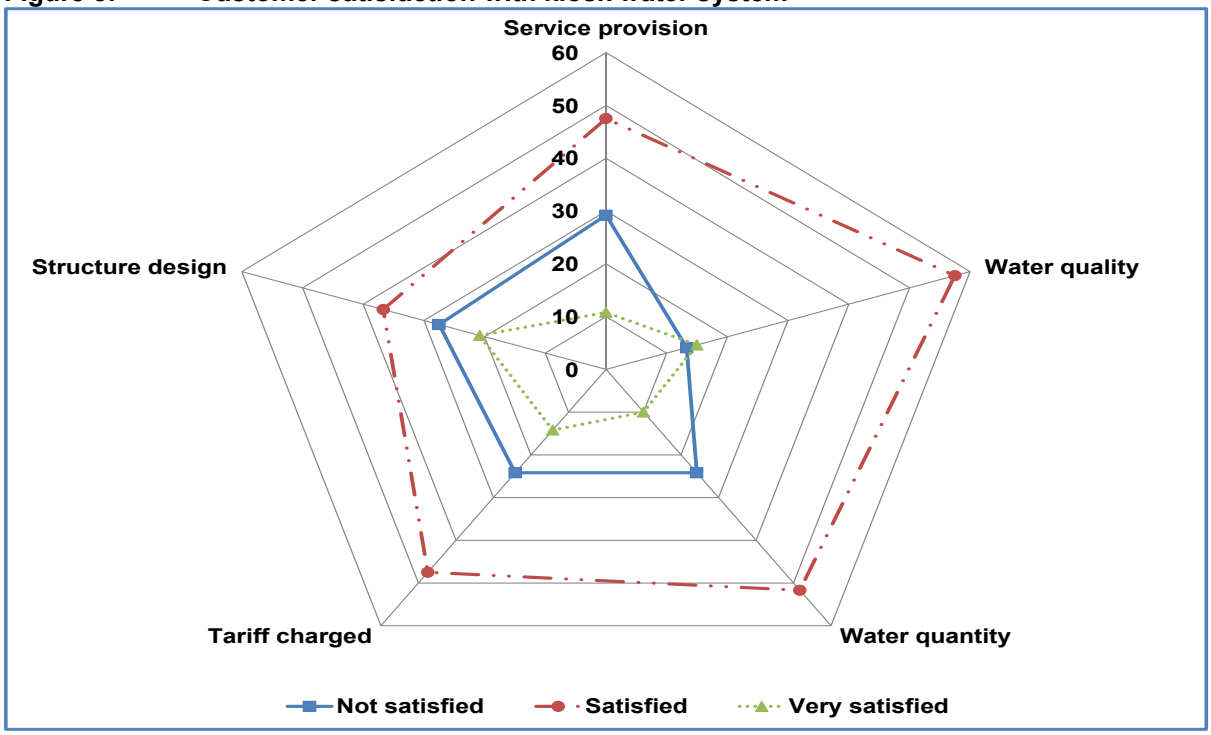
Level of satisfaction	Service provision	Water quality	Water quantity	Tariff charged	Structure design
	Percentage	**Percentage**	**Percentage**	**Percentage**	**Percentage**
Not satisfied	29.2	13.3	24.2	24.2	27.5
Satisfied	47.5	57.5	51.7	47.5	36.7
Very satisfied	10.8	15.0	10.0	14.2	20.8
Total	**87.5**	**85.8**	**85.8**	**85.8**	**85.0**
Missing response	12.5	14.2	14.2	14.2	15.0
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: Author's research findings data analysis (2012) **N=120**

Customer satisfaction with the actual provided services by the water kiosks is analysed using table 17 and figure 9. In figure 9 a plot of the percentage share distribution of the household responses on the three variables namely not satisfied, satisfied and very satisfied is presented. The values ranged from 1 (not satisfied) to 3 (very satisfied). The mid value of 2 represented the variable satisfied. It is nonetheless clear from table 17 and figure 8 that customers using the services of the water kiosk in Kanyama Township were generally

satisfied with both the quality and quantity of water supplied by the kiosks. Out of the 120 respondents interviewed, 57.5% of the respondents were satisfied with the quality of water supplied while 51.7% were satisfied with the quantity of water supplied. Furthermore, 47.5% of the respondents were satisfied with the water kiosk tariff as well as the services provided, respectively.

Figure 8: Customer satisfaction with kiosk water system



Source: Author's research findings data analysis (2012)

Whilst users of the water kiosk system agree that the minimal fees offered is one of the factors for their satisfaction with the services, others factors include the quality of water supplied at the kiosks, the general cleanliness, hygiene and sanitary manner of the water kiosk and surrounding, friendliness and courtesy of the water vendors, orderliness of the operations, and chlorination of water. Box 1 summarizes the respondents' reasons attributed to the level of service satisfaction.

Box 1: Drivers of customer satisfaction

Box 1: Drivers of customer satisfaction

- Even in absence of vendors, you can go with your own pre-paid token and still get the water
- Kiosks are reliable
- Water is available
- Water is chlorinated
- Service is fair and queues are minimal
- Water vendors are friendly and good courtesy
- There is usually order - first come first served basis
- Good opening and closing hours
- Water is very cheap
- Water supplied is clean and affordable
- There is order in operations
- Service is very efficient
- Very hygienic service
- Service very efficient due to pre-paid meters
- Dedicated service and order in operation

Source: Author's research findings data analysis (2012) **N=120**

Similarly, a number of factors contributing to customer service dissatisfaction were highlighted (see Box 2).These factors range from poor attitude and work culture of water vendors to factors of water supply (availability, low pressure and reliability).

Box 2: Drivers of customer dissatisfaction

Box 2: Drivers of customer dissatisfaction

- Sometimes the water goes. It is not always there and so it is very dissatisfying
- Non-availability of water supply
- There are always queues at the water kiosks
- No friendly services and poor courtesy
- Erratic water supply
- Water kiosks usually do not work
- Pre-paid service is not satisfactory because there are a lot of operational difficulties
- Sometimes the water goes when it is highly needed
- Water vendors sometimes do not report for duty
- Too many people
- Fixing more taps would improve the situation
- It is okay but water pressure should improve
- Most of the time there is no water
- Almost every day the water goes. The water kiosks rarely have water
- The service is not that good that is why I use stand pipe

Source: Author's research findings data analysis (2012) **N=120**

In my opinion, the 30% customer service dissatisfaction (see table 17) is very high especially if the CU is striving for long-term sustainability and Box 2 explains why there is this very high dissatisfaction. Therefore, the CU needs to work towards achieving at least 85% service satisfaction levels. This is achievable especially that satisfaction rate on water quality is very high (87%) and this gives the needed motivation to match other factors of satisfaction.

5.4.2 Willingness and affordability to pay

5.4.2.1 Affordability to pay for water services

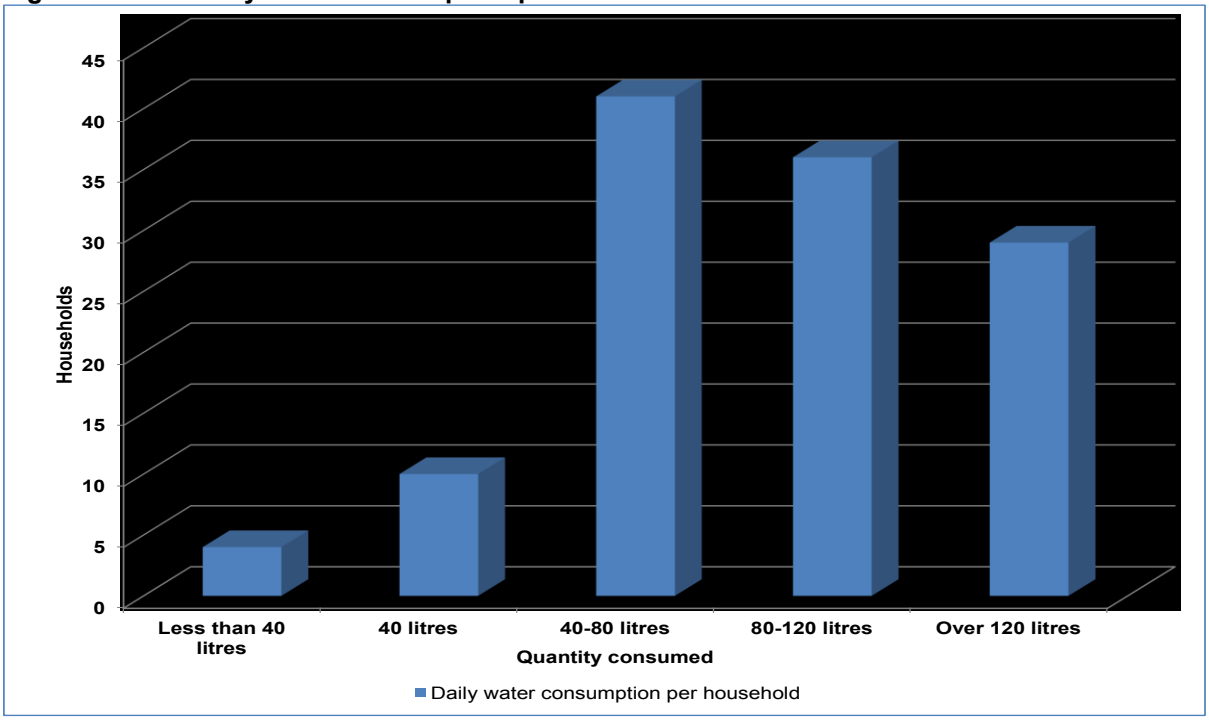
Daily water consumption for the studied households varied from household to household and ranged from less than 40 litres per household per day to more than 120 litres per household per day. The mean of the daily household water consumption was the range 80-120 litres per household per day and so was the median. However, the mode of the daily household consumption was the range 40-80 litres per household per day. Nonetheless, the majority of the households, totalling up to 77 households, representing 64.2% consumed water between the range of 40 litres per household per day and 120 litres per household per day while 4 (3.3%) of the households consumed less than 40 litres per day. Furthermore, 29 households out of the 120 households, representing 24.2% consumed over 120 litres of water per day. Table 18 and figure 9 show the daily water consumptions per household.

Table 18: Daily water consumption per household

Daily household consumption	Number of households	Percentage
Less than 40 litres	4	3.3
40 litres	10	8.3
40-80 litres	41	34.2
80-120 litres	36	30.0
Over 120 litres	29	24.2
Total	**120**	**100.0**

Source: Author's research findings data analysis (2012) **N=120**

Figure 9: Daily water consumption per household



Source: Author's research findings data analysis (2012)

In this study, the per capital consumption rate was calculated to range from 15.4 l/cap/day-23.2 l/cap/day. This is well within the figures of 5 l/cap/day-30 l/cap/day given by the DTF. The mean range of 80-120 litres household daily water consumption and the family size of 5.18 members per house were used in the per capita daily consumption rates calculation. The average family size in Kanyama Township as per (CSO, 2011b) is 4.64 persons per household.

Sources of supply of this water were mainly the water kiosk system. However, some of the respondents never used the water kiosks but depended on either stand pipes, shallow wells and or other sources of water supply. Only 17 of the respondents, representing 14.2% never used the services of the water kiosks while 103 (85.8%) used the services of the water kiosks. However, 43 (41.7%) of respondents out of the 103 respondents used both the services of the water kiosk as well as any of the other three available sources of water supply in Kanyama Township, namely stand pipes, shallow wells and other sources of water supply. Table 19 gives the respondents usage of sources of water supply by type.

Table 19: Sources of water supply use by type

Sources of water supply for the household	Type of water source supplying the household				Total
	Kiosk	Stand pipe	Shallow well	Others	
Multiple	20	8	12	3	43
Single	60	13	2	2	77
Total	**80**	**21**	**14**	**5**	**120**

Source: Author's research findings data analysis (2012)

The cost of water depended on the source of the water supply. The cheapest source being the shallow wells were users paid nothing (ZMK 0.00) and the most expensive being the stand pipes were users paid up to ZMK 100,000 per month. Price for water from the water kiosk ranged from ZMK 100 to ZMK 300 (see table 20). It has to be noted that the costs in

thousands of Zambian Kwacha in table 20 represent the monthly payment of water for the respective water supply source.

Table 20: Cost of water by water supply source

Household water source	Amount in ZMK paid for water												Total
	0	100	200	300	2000	2500	5000	10000	15000	50000	80000	100000	
Kiosk	0	76	2	2	0	0	0	0	0	0	0	0	80
Stand pipe	0	1	1	0	0	0	0	8	2	1	2	1	16
Shallow well	5	5	0	0	2	1	1	0	0	0	0	0	14
Others	0	3	1	0	0	0	0	0	0	0	0	0	4
Total	**5**	**85**	**4**	**2**	**2**	**1**	**1**	**8**	**2**	**1**	**2**	**1**	**114**

Source: Author's research findings data analysis (2012)

This price of ZMK 100 per container of kiosk water given by the majority of the respondents corresponds well with the prices given by the water kiosk vendors. But this price is not in conformity with the prices given by the CU and NWASCO which is ZMK 50 per 20 litres container of water. A total of 76 respondents out of the 80 respondents who depended on water kiosk for water supply paid ZMK 100 per container of water. This translates to 95% of the respondents collecting water from water kiosks.

The majority of the households were within the income range of ZMK 300,000-ZMK 900,000 per month (see table 21). The median and the mode of the household income was the range ZMK 900,000-ZMK 1,300,000. On the other hand, the average monthly expenditure of the households surveyed in Kanyama Township was ZMK 731,512.61. However, this monthly expenditure ranged from ZMK 100,000 to ZMK 2,100,000 with the median being ZMK 600,000 and the mode of ZMK 500,000. But the average monthly income of 30 of the 120 households or 25% was below this average monthly expenditure of ZMK 731,512.61.

Table 21: Household average monthly income

Household average monthly income		Number of households	Percentage
Valid	Less than 300,000	2	1.7
	300,000-600,000	28	23.3
	600,000-900,000	28	23.3
	900,000-1,300,000	31	25.8
	1,300,000-1,600,000	15	12.5
	Over 1,600,000	15	12.5
	Total	**119**	**99.2**
Missing	No response	1	0.8
Total		**120**	**100.0**

Source: Author's research findings data analysis (2012) **N=120**

Table 22 presents the monthly household expenditure on water supply by the respective household daily consumption patterns. Estimated average monthly expenditure on water supply ranged from ZMK 0.00 to ZMK 200,000 with the mode and median being ZMK 50,000 and ZMK 40,000 respectively. A total of four (4) respondents whose daily water consumption was less than 40 litres per household per day paid up to a maximum of ZMK 60,000 per month while nine (9) respondents who consumed 40 litres per household per day paid up to a maximum of ZMK 80,000 per month. Similarly, 39 respondents consuming between 40-80 litres per household per day paid up to a maximum of ZMK 100,000 whereas the respondents consuming between 80-120 litres per household per day and above 120 litres per household per day paid up to a maximum of ZMK 200,000 and ZMK 100,000 per household per day, respectively.

Table 22: Household monthly expenditure on water by daily consumption patterns

Monthly water expenditure (ZMK)	Daily household water consumption					Total
	Less than 40 litres	40 litres	40-80 litres	80-120 litres	Over 120 litres	
0	0	0	0	1	0	1
200	0	0	0	1	0	1
5000	1	0	0	0	0	1
10000	1	3	7	4	1	16
15000	0	0	5	0	1	6
20000	0	1	6	4	1	12
24000	0	0	0	0	1	1
28000	0	0	0	0	1	1
30000	1	1	1	0	3	6
35000	0	0	0	0	2	2
40000	0	1	6	5	2	14
45000	0	0	0	2	0	2
50000	0	1	8	6	5	20
60000	1	1	1	5	5	13
70000	0	0	1	1	2	4
75000	0	0	1	0	0	1
80000	0	1	1	3	3	8
90000	0	0	0	0	1	1
100000	0	0	2	2	1	5
150000	0	0	0	1	0	1
200000	0	0	0	1	0	1
Total	**4**	**9**	**39**	**36**	**29**	**117**

Source: Author's research findings data analysis (2012) **N=120**

Based on the household's daily consumption rates provided by the respondents, estimates can be made on household's monthly expenditure on water. These can then be compared with the actual expenditure on water given by the respondents. As a result, table 23 gives the calculated monthly household expenditure on water based on the respondent's daily household consumption figures.

Table 23: Calculated monthly household expenditure on water based on consumption rates

Consumption range (l/hh/d)	Monthly calculated cost (ZMK)			
	Water kiosk	Stand pipe	Shallow well	Other
Less than 40	6,000	10,000-100,000	0-2,500	6,000-12,000
40	6,000	10,000-100,000	0-2,500	6,000-12,000
40-80	6,000-12,000	10,000-100,000	0-2,500	6,000-12,000
80-120	12,000-18000	10,000-100,000	0-2,500	6,000-12,000
Over 120	Above 18,000	10,000-100,000	0-2,500	6,000-12,000

Source: Author's research findings data analysis (2012) **N=120**

Table 23 is therefore a realistic presentation of the monthly household expenditure on water. When tables 22 and 23 are compared and contrasted, it can be concluded that the highest cost households pay for water supply in Kanyama Township is ZMK 100,000 per month for water from a standpipes and at least ZMK 18,000 per month for water from the water kiosks.

Taking the average monthly household income to be the mode (ZMK 900,000-ZMK 1,300,000 per household per month), it is clear that the majority of the respondents can afford to pay for the water supply services in the event of having the supply connected to their respective households at the current regulated tariff of the CU. In reality, nonetheless, the average monthly household income in Kanyama Township should be around ZMK 500,000. Therefore, it is not coincidental that the mode of the estimated monthly average expenditure in this study was found to be ZMK 500,000. This value is within the same range of monthly average expenditure found by (CSO, 2011a). As a result, with a monthly water expenditure of ZMK 30,000 and the available income of ZMK 500,000, the monthly expenditure on water represents 6% while for the household monthly water expenditure of ZMK 18,000, this translates to 3.6%. This range 3.6% and 6% is within the observed World Bank Affordability To Pay (ATP) value of 5% and as reported by Fujita, Fujii, et al. (2005). Nonetheless, it has to be noted that despite this scaled down household monthly income of ZMK 500,000, the household's ability to pay for improved water supply services are still not impeded. Thus, the households could still afford to pay for individual household water connection.

Furthermore, if the per capita consumption rates are factored into the calculation of the monthly costs of water based on individual household connection, then each household will consume almost twice the quantity of water per month which will result into the doubling of the monthly water expenditure. In this case, the lowest boundary of the household monthly water consumption will therefore become 2,393.16 litres, calculated at the per capita consumption rate of 15.4 l/cap/day. Similarly, at the per capita consumption rate of 23.2 l/cap/day the household will consume a minimum of 3,605.28 litres per month. Therefore, the monthly water expenditure based on the current Lusaka Water and Sewage Company tariff for individual household connections will then become ZMK 5,743.58 for the per capita consumption rate of 15.4 l/cap/day and ZMK 8,652.67. These again are the consumptions within the 1st RBT block. These monthly water expenditures will represent 1.15% and 1.73% of the monthly household income of ZMK 500,000.

5.4.2.2 Willingness to pay for improved water supply source of a household connection

Household's willingness to pay for improved water supply sources was assessed using the bidding game. The starting bidding price for the willingness to pay for the improved water supply source was ZMK 500 per 200 litres container of water, which is commonly known locally as a drum. Improved water supply source implied individual household pipe water supply connection. Table 24 presents the results of the willingness to pay bidding game.

Table 24: Respondent's bids for willingness to pay for a household connection

Response	ZMK 500		ZMK 1000		ZMK 750		ZMK 450		ZMK 250	
	Number of bids	Percentage	Number of bids	Percentage	Number of bids	Percentage	Number of bids	Percentage	Number of bids	Percentage
No	6	5.0	38	33.3	4	10.5	5	83.3	5	100.0
Yes	114	95.0	75	65.8	1	2.6	1	16.7	0	0.0
Not sure	0	0.0	1	0.9	33	86.8	0	0.0	0	0.0
Total	**120**	**100.0**	**114**	**100.0**	**38**	**100.0**	**6**	**100.0**	**5**	**100.0**

Source: Author's research findings data analysis (2012) **N=120**

A total of 114 (95%) of the respondents were willing to pay the ZMK 500 per drum while 6 (5%) of the respondents were not willing to pay such an amount for that quantity of water. Furthermore, out of the total 114 respondents that were willing to pay ZMK 500 for 200 litres of water, 75 (65.8%) were willing to pay up to as much as ZMK 1,000 for the same quantity of water while 38, representing 33.3% were not will to pay up to ZMK 1,000 per 200 litres of water and only 1 (0.9%) of the respondents were not sure. In addition, out of the 38 respondents that were not willing to pay up to ZMK 1,000 for 200 litres of water, 33 (86.8%) of the respondents were willing to pay ZMK 750 per 210 litres of water while four (4) of the respondents were not, with one (1) not sure, representing 10.5% and 2.6%, respectively. Similarly, out of the 6 respondents that were not willing to pay ZMK 500 for a 200 litres container of water, only one (1) was willing to pay ZMK 450 for the same volume of water while five (5) other respondents were not. In fact, none of these 5 respondents were even willing to pay for a household water supply connection at ZMK 250 per 200 litres container.

The preference of individual household connections has been demonstrated by the cost households are willing to pay for the service. It has shown that at the current tariff of the 1st RBT block tariff, 95% of the respondents were willing to have individual household connections and a further 65.8% of the 95% were willing to even pay at the current 5th RBT block tariff for the service. LWSC is charging ZMK 2,400 and ZMK 4,800 per m^3 of water for individual household connection for the 1st RBT block and 5th RBT block, respectively. Therefore linking household income and the resultant bids of the respondents, it can be established that the households will still be capable of paying at these bid prices. The monthly water expenditure based on the willingness to pay of ZMK 2,500 per m^3 and a per capita water consumption of 15.4 l/cap/day will therefore translate to ZMK 5,982.90 monthly water expenditure ZMK 9,013.20 per month at the consumption rate of 23.2 l/cap/day. On the other hand, at the wiliness to pay of ZMK 5,000 per m^3 of water, the respective households will pay ZMK 11,965.80 and ZMK 18,026.40 per month. These again are the consumptions within the 1st RBT block and are clearly between 1.2% and 3.6% of the total household expenditure. It has however to be noted that all these calculations assumes that

there is no change in the consumption pattern.

5.5 Future Relevance of Water Kiosks

Water kiosks provide two main functions, namely the supply of water to the community and the provision of commission to the water vendors. Therefore, the water kiosk system provides employment and a source of livelihood and income for the water vendors. This is in addition to providing water to the community at a very minimal tariff. Table 25 presents the summary of responses on the future relevance of water kiosks.

Table 25: Future relevance of water kiosks

Question	Summary of answers given by the three institutions
How relevant will the water kiosk system be in the future given the improvement in income and general welfare of the people in these areas?	The closed kiosk system will perhaps continue operating as a kind of kiosk where other things are sold but the open one becomes basically of no use as more people get to have yard connections because they can afford it
	Everything has time and everything. The status core must not remain the same. So the relevance of kiosk over time is actually diminishing overtime. What we have done even in our projects is that we are reducing on a number of kiosks that we are putting up
	As the income improves, water kiosks will slowly be phased out but dependent on the availability of the space (land for laying the pipe network system)
What measures have you developed to ensure that the water kiosk remain relevant even in the improvement in income and general welfare of the people in these areas?	Initially the kiosk setup has a short-term solution to the supply of water. The only measures that have been taken to ensure that they are relevant is to build closed kiosks which kind of continue to operate as shops for other groceries or other small things
	What we have done is that in future, we might not need for instance vendors. We might try and see how we can construct kiosks that will allow people to get water using cards (tags)
	Kiosks management in Zambia is a well-structured system and for me I am assured of sustainability. Furthermore, some of these kiosks are being run by delegated management hence improving efficiency
How can you foresee the future of the water kiosk system in Zambia and how will such a system be sustained?	I think it is a good solution for very poor areas as a means to provide safe water as close as possible to the residences in these areas. But I also see it as a kind of service that people will only associate with the poor and as people's income improve people will not then want to be associated with that and would rather move away from that
If you had an opportunity to improve on the current water kiosk system, what is it that you can change and why?	One thing that we are trying to introduce is the pre-paid meter but Regulator need to look a little bit further into having a tariff structure for really poor people
	Removing the aspect of the vendor particularly in areas where the sales are very small. But what we know is that in highly populated areas we still need vendors because we are creating employment to a lot of people.
	Install pre-paid meters and make the tags (tokens) available to people. What we have to move towards is where each customer will have a tag

Source: Author's research findings data analysis (2012) **N=3**

It is clear from the responses in table 25 that the water kiosks system was meant to be a temporary measure but over the years the system has noticeably proved to be a critical part of the system in the provision of water supply to low-income urban and peri-urban areas of the City of Lusaka. Thus, the status core has not changed and this notion is still being held.

Nonetheless, water kiosk system offers an acceptable compromise between the absence of space for a more conventional water supply scheme and the total absence of safe water supply to the community.

The three institutions (NWASCO, DTF and LWSC) are in agreement that with improved income, wealth and welfare of the people in the low-income urban and peri-urban areas, the relevance of water kiosks will diminish as more people will prefer individual household connections. The question of affordability for individual house connection to the majority of the people will not arise even if such costs will still be borne by individuals, as the case is at the moment. Nonetheless, they were also in agreement that water kiosks will continue playing a key role in the supply of water because not everyone will afford individual household connections. To this effect, DTF has reduced on the financial support to the CUs for the construction of water kiosk. LWSC, on the other hand, anticipate the closed kiosk system to continue operating even in the event of improved income, wealth and welfare by the people in Kanyama Township.

Interventions to guarantee the relevance of water kiosks in the future largely evolve around making the kiosks *'self-vending'* through installations of pre-paid meters and making the tags (pre-paid tokens) available to every end-user of the service. This will ultimately eliminate the water vendor in the water kiosk chain. Unfortunately, the drawback is the high cost of the technology.

Whilst it can be argued that the well-structured nature of the kiosk management in Zambia is one of the measures developed to ensure that water kiosks remain relevant even in the wake of improvement in income and general welfare of the people in low-income urban and peri-urban areas, the over-dependency on donor support for financing the water kiosks' construction is a major setback. It is also not difficult to foresee why with the improvement in the general income of the urban poor, water kiosks will quickly diminish in their status as the costs for household connections will no longer be an impediment and inhibiting factor for individuals to hook into the water distribution network, as the case is currently. This may even explain why the future of the water kiosks seem not be a focus of planning as a long-term sustainable solution for water supply in low-income urban and peri-urban areas for the commercial utility company. As far as the Lusaka Water and Sewage Company are concerned, water kiosk system was initially setup as a short-term solution and this status core continues to even to this day.

Chapter 6: Conclusions

6.1 Conclusions

Financial sustainability for the purposes of this study has been viewed specifically as *'…the ability of the water kiosk system in Zambia to cover at least its operation and maintenance costs…'* while long-term financial sustainability has been defined *'…to cover more than just the operation and maintenance costs but capital costs as well'*. This, nonetheless, broadly covers all aspects of institutional organisation and management which includes institutional, legal and financial mechanisms and setup. Aspects of financial mechanisms and setup include the tariff structure as well as the costs of constructing the water kiosks. Consequently, although this study has demonstrated that the water kiosks in Kanyama Township are not only extremely well-organised institutionally but are also legally bound by the Regulator in terms of service guarantees and tariffs, It is also clear that the water tariff in Zambia covers at least operation and maintenance costs (i.e. the costs of providing the service). Therefore, the regulated price of ZMK 50 per 20 litres container covers the operation and maintenance costs but not capital costs.

It is also evident from the study that the current financing arrangement of the Devolution Trust Fund (DTF) was unsustainable since it was heavily dependent on donor support. Therefore, in order for the DTF to be sustainable, it needed to raise the finances from locally available resources and institutions within the country. A system established on locally available resources always proves to be a long-term sustainable option.

Despite this, the water kiosk systems have the potential of raising adequate revenues to finance recapitalization. The study has also demonstrated that the actual costs of the kiosk water in Kanyama Township are on the upper boundary of US$0.40-US$1.00, the range which GWI (2004) as cited in Komives, Foster, et al. (2005) found to be adequate to cover some capital costs. The current cost of the water at the kiosks in Kanyama Township is just slightly above US$1.00. The 20 litres container of water is sold at ZMK 100 (ZMK 5000 per m^3) which is more than the 5^{th} RBT block tariff of ZMK 4,800 per m^3. Therefore, the water kiosks in Kanyama Township are raising enough revenues to even cover some capital costs. By and large, all the sales from the water at the water kiosks are remitted to Lusaka Water and Sewage Company.

The revenue generated from the sale of water at the kiosks is able to support the two services provided by the water kiosk which primarily are the supplying of the water and the paying of the vendor commissions. Therefore, the sustainability of the water kiosks system in Kanyama Township is equally dependent on its ability to generate adequate revenues. Adequate revenues guarantee reasonable commissions for the water vendors to make a decent livelihood.

Regular maintenance of the water kiosk system is also an important component of the sustainability of the water kiosk. Regular maintenance of the water kiosk system has guaranteed the availability of water supply. Availability of the water supply has enormously contributed to the overall sustainability of the water kiosk system -- as not only more revenues are collected for the commercial utility (CU) which in turn is made available for its maintenance but also assures vendors of adequate income which has effectively kept them motivated.

Devolved and streamlined management system of the water kiosk is yet another aspect that has ensured the system's long-term sustainability. A functional and well-structured devolved management system has the capacity to increase confidence in the end-users particularly when faults are responded to and dealt with swiftly. Nonetheless, devolution of management

should be both in terms of monetary -- having the powers to use the money raised from the sale of water from the water kiosks in O&M activities of the kiosks -- and in terms of other management functions which mainly hinge on rational independent decision making.

The current funding mechanism for increased access to water supply to poor urban and peri-urban areas need to be evolved, from donor overdependence to one that is supported through local institutions and finances. This is fundamental for long-term sustainability. Furthermore, the current financing agreements of projects need to be transformed from grant-based financing agreement to revolving fund-based. This is possible since the kiosks are capable of financing recapitalization and reinvestments, going by the costs of the water at water kiosks in Kanyama Township. At the moment, monthly water sales from the kiosks average ZMK 984,000 while the O&M costs are about ZMK 340,000.

This study has also shown that individual household connections are a preferred water system in Kanyma Township but the hooking-up costs are the main prohibiting factor. The preference of individual household connections was demonstrated by the cost households are willing to pay for the service. It has shown that at the current tariff of the 1st RBT block tariff, 95% of the respondents were willing to have individual household connections and a further 65.8% of the 95% were willing to even pay at the current 5th RBT block tariff for the service. Importantly, individual households were found to have the ability to pay for the improved service. This study has found that households in Kanyama Township were paying between 3.6% and 6% of their monthly income to water supply. Various studies have shown that households in developing nations are can afford to pay up to 5% of their monthly household income. The five percent (5%) of monthly household income is the observed acceptable margin the households in developing countries are willing to pay for water supply and sanitation services (Fujita, Fujii, et al., 2005, Mcphail, 1993).

In general, the services of the water kiosk system will diminish with the increase in the income and general wealth of the people in poor urban and peri-urban areas even if there will always be some people who will need the services of water kiosks. As a result, what is more likely to happen is the streamlining of the water kiosk system leading to the disappearance of the water vendors from water kiosks chain. The use of pre-paid meters is an indication of moving towards a self-vending water kiosk system.

In addition, water kiosks need not be viewed as the *'last mile'* solution to improving access to clean and safe water to the majority of the urban poor where such services are lacking but rather as a *'stop-gap'* measure. This is because of the fact that the need to invest in infrastructure for provision of water in poor urban and peri-urban areas will always be there and as such the water kiosks will only provide a partial solution. Thus, provision of water kiosks should never be considered as an efficient way of improving access to water supply to areas where the CUs have failed to provide the water supply and distribution networks. Forcing people to come and draw water from a centralized system like a water kiosk is not a measure of efficiency of the water utility company. Apparently, huge profits can be made through the water kiosks system but this does not underline any improvement in the efficiencies of service provisions especially to these areas where the water kiosks have been constructed.

Nonetheless, this study has therefore demonstrated that although the water kiosks system in Kanyama Township of Lusaka may be able to cover operation and maintenance costs, they are nevertheless, not a long-term financial sustainable solution for providing water supplies to poor urban and peri-urban areas in Zambia for a number of reasons:

1) The water kiosks are not able to cover capital costs through the service user fees that they charge for water;

2) The tariff structure that is approved by NWASCO for water kiosks may not be adequate to cover costs of providing the services (O&M costs);

3) The water kiosks tariff only covers part of the costs of the water utility company with the rest of the costs expected to be covered through cross-subsidization from customers with individual household connections;

4) The water kiosk system wholly depends on donor communities to finance its constructions, and

5) The demand for the services provided by the water kiosk system will diminish as the general incomes of the people in low-income urban and peri-urban areas improves.

Therefore, this proves the hypothesis that *'Water kiosks are not a financial sustainable solution for long-term supply of drinking water to low-income urban and peri-urban areas'.*

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Annex 1: Research Tools and Instruments

1A: Interview Schedule for LWSC, NWASCO AND DTF

Does the cost and financing arrangements of the water kiosks guarantee long-term sustainability? What institutional organization and legal frameworks are in place?

1. What was the total cost for the construction of 18 water kiosks in Kanyama Township?
2. How is the construction of the water kiosks financed? What are the sources of these finances?
3. What is your organization's contribution to the total investment cost of these water kiosks?
4. What is the total contribution of the Government of the Republic of Zambia to these finances?
5. How is the ownership of the water kiosks in Kanyama Township structured?
6. What are your roles in the water kiosk system?
7. What management system has been instituted for these water kiosks?
8. What regulatory framework is in place for water kiosk system and what does it involve?

Does the price of water reflect the investment, operation and maintenance costs?

9. What tariff structure in place for the water kiosks?
10. What percentage of this tariff represents operation, maintenance and investment costs?
11. What is done with the money realized from the sale of water from the water kiosks?
12. What types of payments are given to the operators of water kiosks? What is this payment based on? How frequent is such payment made?
13. What problems do you face with the day to day operation of the water kiosk?
14. How is the maintenance of the water kiosk system organized and undertaken?
15. What are the standards, operations and maintenance norms of the water kiosk system?
16. What are the monthly average operational costs of the water kiosk system?
17. What are the monthly average maintenance costs of the water kiosk system?
18. What percent of budget has been set aside for the reinvestment (i.e., expansion; improvement of service delivery, etc) in the water kiosk system?

Are the customers satisfied with the water kiosk services? Are they willing to pay more for improved services like household connections?

19. What opinions do the locals (Kanyama Township residents) have on the water kiosk system?
20. How relevant will the water kiosks system be in the future given the improvement in general household income as well as the general lifestyle and welfare of people in these areas?
21. What measures have been developed to ensure that water kiosk systems remain relevant even in the events of improvement in general household income as well as the general lifestyle and welfare of people in these areas?
22. How can you foresee the future of the water kiosk system in Zambia and how will such a system be sustained?
23. If you had an opportunity to improve on the current water kiosk system, what is it that you can change and why?

Other supportive questions

24. What is the basic drinking water requirement in Zambia?

25. What are the roles of the water kiosk operators?
26. What is the breakdown, by the main components, i.e. water kiosk structure and pipe network system, of this construction cost for the water kiosks built in Kanyama Township?
27. How is the water supplied to the water kiosks?
28. How much rent is paid by the water kiosk operators for operating the water kiosk?
29. What other services are provided which the water kiosk operators are supposed to pay for, and how much do they pay for such services?
30. On average, how much water is sold from each water kiosk each month? *[Can you kindly provide us with the records-LWSC]*
31. On average, how much money is raised from the sale of water from each water kiosk each month? *[Can you kindly provide us with the records-LWSC]*
32. What type of understanding exists with the operators of the water kiosk?
33. What kind of assistance do you render to water kiosks operators?
34. What types of major service interruptions are usually experienced with the operations of the water kiosks?
35. What design and construction issues do the water kiosks have?
36. What measures have you put in place to at least resolve these issues?
37. What other solutions are there for the delivery of drinking water supplies to peri-urban and low income areas such as Kanyama Township?

1B: Interview Schedule for Water Kiosk Vendors

Does the cost and financing arrangements of the water kiosks guarantee long-term sustainability? What institutional organization and legal frameworks are in place?

1. How long have you been operating this water kiosk?
2. What are the businesses operating hours for this water kiosk (when is it open and closed)?
3. How did you come to operate this water kiosk?
4. Who owns the water kiosk?
5. What is this pay based on?
6. What type of understanding is there between you and the owners of the water kiosk?
7. What kind of assistance do you get from the owners of the water kiosks?

Does the price of water reflect the investment, operation and maintenance costs?

8. How much rent do you pay for the water kiosk?
9. What other money do you pay in addition to the rent for the water kiosk?
10. How much do you charge for the water?
11. On average, how much water do you sale each day? *Can you kindly show us these records?*
12. On average, how much money do you raise from the sale of water each day? *Can you kindly show us these records?*
13. What do you do with the money from the sale of water?
14. How do you get paid for this work?
15. What expenses related to the operation of the water kiosk do you (personally) pay for?
16. What problems do you face with the day to day operation of the water kiosk?
17. What type of major service interruption have you experienced?

Are the customers satisfied with the water kiosk services? Are they willing to pay more for improved services like household connections?

18. What complaints do you receive from your clients about your opening and closing times of the water kiosk?
19. What opinions do the locals (Kanyama Township residents) have on the water kiosks?
20. How available and reliable is the water supply from this water kiosk?
21. How often do you experience the queues at this water kiosk?

Other supportive questions

22. What is the name of the water kiosk?
23. Are you happy with the pay?
24. Is the pay adequate?

1C: Household Questionnaire

Name of Enumerator: _____ Date of Interview: _____

Time Interview Starts: _____ Time Interview Ends: _____

House Serial Number: _____ Questionnaire Serial #: _____

PART 1
SOCIO-ECONOMIC STATUS OF THE HOUSEHOLD AND SOURCES OF WATER SUPPLY

1. What is the gender of the respondent? Male ☐ Female ☐

2. In what age range are you?
18-25 ☐ 25-35 ☐ 35-45 ☐ Over 45 ☐

3. How many people live in this house? ☐

4. What is the gender of the head of the household? Male ☐ Female ☐

5. Where do you get water for all your household requirements?
Single source ☐ Multiple sources ☐

6. Kindly describe to us the different sources of your household water supply:

Water supply source 1	**Water supply source 2**	**Water supply source 3**
Name:	Name:	Name:
Description: 1) Kiosk 2) Standpipe 3) Shallow well 4) Others:	Description: 1) Kiosk 2) Standpipe 3) Shallow well 4) Others:	Description: 1) Kiosk 2) Standpipe 3) Shallow well 4) Others:

7. On average how much water does your household uses per day for all its requirements?

40 litres	**40-80 litres**	**80-120 litres**	**Over 120 litres**
☐	☐	☐	☐

8. How far from your household are these places where you get the water from?

	Less than 5 minutes' walk	**Over 5 minutes' walk**
8.1 Water supply source 1	☐	☐
8.2 Water supply source 2	☐	☐
8.3 Water supply source 3	☐	☐

9. How much money do you pay for each full container of water from each source of your household water requirements?

Water source	Amount paid
Water kiosk	
Standpipe	
Shallow well	
Others	

10. How readily available is the water from the respective water sources?

	WS 1	WS 2	WS 3	WS 4
10.1 Available whenever needed				

	WS 1	WS 2	WS 3	WS 4
10.2 Never available when needed				

11. How long do you usually wait in a queue at the water source?

11.1 Water supply source 1 Minutes 11.2 There is never a queue

11.3 Water supply source 2 Minutes 11.4 There is never a queue

11.5 Water supply source 3 Minutes 11.6 There is never a queue

11.7 Water supply source 4 Minutes 11.8 There is never a queue

PART 2
CUSTOMER SATISFACTION OF THE KIOSK WATER SUPPLY

12. Are you aware about water kiosks within your area?
Yes No

13. How often do you use the services of water kiosks?
Everyday Sometimes Never

14. From 1 up to 3, with 1 being the lowest and 3 being the highest, how satisfied are you with the services provided by the water kiosks?
Not satisfied Satisfied Very satisfied

14.1 Kindly give your reasons for your ranking:

15. From 1 up to 3, with 1 being the lowest and 3 being the highest, how satisfied are you with the quality of water provided by the water kiosks?
Not satisfied Satisfied Very satisfied

16. From 1 up to 3, with 1 being the lowest and 3 being the highest, how satisfied are you with the quantity of water supplied by the water kiosks?
Not satisfied Satisfied Very satisfied

17. From 1 up to 3, with 1 being the lowest and 3 being the highest, how satisfied are you with the amount paid for water that is supplied by the water kiosks?

Not satisfied ☐ Satisfied ☐ Very satisfied ☐

18. From 1 up to 3, with 1 being the lowest and 3 being the highest, how satisfied are you with the structure of the water kiosks its design?

Not satisfied ☐ Satisfied ☐ Very satisfied ☐

18.1 Kindly give your reasons for your ranking:

PART 3
WILLINGNESS TO PAY FOR INDIVIDUAL HOUSEHOLD CONNECTION

19. If the price you are charged for water is ZMK 500 per drum (210 litres) for individual household water connection, would you like to have an individual household metered water connection?

Yes	☐	Go to Question 20
No	☐	Go to Question 22
Not sure	☐	Go to Question 22

20. If the price you are charged for water is ZMK 1000 per drum (210 litres) for individual household water connection, would you like to have an individual household metered water connection?

Yes	☐	Finished with this section
No	☐	Go to Question 21
Not sure	☐	Go to Question 21

21. If the price you are charged for water is ZMK 750 per drum (210 litres) for individual household water connection, would you like to have an individual household metered water connection?

Yes	☐	Finished with this section
No	☐	Finished with this section
Not sure	☐	Finished with this section

22. If the price you are charged for water is ZMK 450 per drum (210 litres) per individual household water connection, would you like to have an individual household metered water connection?

Yes		Finished with this section
No		Go to Question 23
Not sure		Go to Question 23

23. If the price you are charged for water is ZMK 250 per drum (210 litres) for individual household water connection, would you like to have an individual household metered water connection?

Yes		Finished with this section
No		Finished with this section
Not sure		Finished with this section

PART 4
AFFORDABILITY TO PAY FOR INDIVIDUAL HOUSEHOLD WATER CONNECTION

24. How many household members are wage earners? ____

25. What is the occupation of each wage earner?

Wage Earner	Occupation types					
	Self employed	Privately employed	Government	Own business	Trader/ marketeer	Other
1						
2						
3						
4						

26. What is the household's total cash income per month from all sources?

Wage Earner	Income Range (ZMK)					
	Less than 300,000	300,000-600,000	600,000-900,000	900,000-1,300,000	1,300,000-1,600,000	Over 1,600,000
1						
2						
3						
4						

27. On average, what is your total monthly household expenditure?

Average monthly household expenditure	

28. On average, what is your total monthly expenditure on water?

Average monthly water expenditure	

Annex 2: In-depth Interviews Transcriptions

My name is Sankwe Kambole, a Masters student at IHS at Erasmus University Rotterdam. Knowing that you are pressed with time, I will just go straight on with questions, if you do not mind.

What was the total construction cost of the 18 kiosks in Kanyama Township?

I have to look for that information but an average cost of the kiosk at that time was about ZMK 5,000,000 for the open type per kiosk then the closed type was a little more expensive, I think it was between ZMK 10,000,000 and ZMK 15,000,000.

How is the construction of the water kiosk financed? What are the sources of these finances?

Sometimes the financing is from Lusaka Water and Sewage own budget and so we just go and build after we have confirmed with the community in terms of the location. But also if we get a grant for instance, as the case was with Kanyama, we got a grant from DTF we build the cost of that into the proposal we submitted to DTF. So that cost is then covered by the grant itself. So, the customer does not have to pay anything towards the construction of the water kiosk.

What is your organisation's contribution to the total investment costs of these water kiosks?

That was done under the grant from DTF. The company's contribution was mainly through the staff - the staff costs and also on the general social and community sensitization that was borne by the company but infrastructure was covered through the grant.

So, in terms of percentage how much was this?

It could be within 10-15%, I think. Certainly 10-15%...

What is the total contribution of the Government of the Republic of Zambia to these finances?

That I would not know exactly because what they do is finance the Devolution Trust Fund, the Devolution Trust Fund was set up by the government as a basket fund for peri-urban infrastructure development. So the government has its budget allocated for that but also other donors that are interested in the sector also finance the DTF...

How is the ownership of the water kiosk in Kanyama structured?

The infrastructure itself is owned by Lusaka Water and Sewage and Kanyama Water Trust. I think you are aware that in Kanyama we have two groups supplying water - there is Lusaka Water and Sewage directly and also Kanyama Water Trust under delegated management from Lusaka Water and Sewage, so they basically still operate under Lusaka Water and Sewage. The infrastructure itself where the pipes are and where to control water is owned by Lusaka Water and Sewage. But it is usually constructed, as you know in informal areas that the problems we have is land, it is constructed on land that is negotiated by the owners or the people around the houses who are nearest but also the selection of these points is done by the community itself. We hold these meetings, zone by zone, and decide where they think it is appropriate to have the water point.

What are your roles in the water kiosk system?

Supplying the water; holding the election of the water vendor who we elect from the community; collecting that money from the vendor, and then accounting for the water that is used. So, also do the maintenance O&M of the kiosk - that is carried out by ourselves. Because the vendor is paid commission for selling water on behalf of the utility.

What management system has been instituted for these water kiosks?

The ones we have in Kanyama are managed by Lusaka Water and Sewage directly. The Peri-Urban Department is split into three different zones - we call them the commercial zones and this is based on geography. So, we have the peri-urban areas in the west of Lusaka and we call that the peri-urban west; some in the south of Lusaka - peri-urban south; some in the east and we call those peri-urban east. Kanyama falls in the peri-urban south. That particular zone has a head who is a community development person and then we have under that particular zone a crucial person who is a technical supretendant, a couple of plumbers and some people dealing with billing - they do not deal with Kanyama only but they are responsible for the whole zone, the peri-urban south zone. The community contribution or involvement comes in at a point where we get the vendors. So the CDOs or Community Development Organizations, for instance in Kanyama, the Ward Development Committee,

is the one that we consult to propose or recommend a number of people that we want to act as vendors or water vendors. They decide, select the preferred person and send us the names who we in turn interview. We give them criteria of what kind of people that we want, the level of educationa and the kind of work that such a person will be performing. A selection of a vendor is made after a one-to-one discussion or interview. So, that is the person that sits on the taps and the roles are that I explained earlier on to dispense the water, to collect cash on behalf of the company and in turn surrender the collected money to our cashiers. But if there is any problems in terms of leakages, no water supply, quality of water and so on and so forth that is communicated by the vendor to our office in Kanyama - we have our office there - to the cashier there. The cashiers then submit the complaint to the superintendent. That is how the system works.

What regulatory framework is in place for water kiosk and what does it entail?

The Regulator just regulates the tariffs that apply. They also encourage us to open the kiosks for as long as possible in terms of opening hours... They would like it to be 24 hours although it may not possible. However, since you have been there, you have noticed that we have the pre-paid meters that are having been installed. So that is in a way to try to provide a service as long as there is supply in line - meaning that the 24 hours being eventually the target. But people have not been forth coming in getting the tokens as individuals...

So, is it that you have not been doing very good information dissemination and communicating to the general community?

No, we actually are doing that... There are some people who actually have the token. I think people just gotten used to the situation that they walk to the tap and found someone there who dispenses water for them but there are some who have... They go as and when they want water...

But the target is 24 hours?

Yes, that is the whole point of installing pre-paid meters...

But on average the kiosks are doing 7-8 hours a day?

12 hours mostly. For those that have tokens basically they have access for 24 hours.

What tariff structure is in place for the water kiosk?

For the water kiosk we just sell water by the bucket, by a 20 litre container that is a standard that we have at a kiosk. And this is basically a regulated price from NWASCO, the Regulator. It is the lowest price of water you can get.

What percent of the tariff represents operation, maintenance and investment cost?

There is no investment cost in the tariff. It is all purely to do with operation and maintenance. Whatever is collected there really is for operation and maintenance. The tariff does not allow for infrastructure recapitalization.

What is done with this money realized from the sale of water from the kiosks?

That is the same money that vendors' commissions are paid out from. So the vendors get about 40% of what they collect. But whatever money that is collected on daily basis is remitted to Lusaka Water and that is the same money that goes back into the general O&M of infrastructure.

What type of remunerations is given to the vendors?

It is a commission basis - 40% of that - between ZMK 200,000 and ZMK 1,000,000. As I said it depends on the location of the kiosk; how busy it is; how many customers... They just collect 40% of whatever moneys they have collected. So they keep a record themselves of how much money they have made in a month and at the end they work out what their money due to them and from our part we also work out how much money has been collected and then we pay out the 40%.

This is paid at the end of the month?

Yes, at the end of the month. It is never paid as they collect the money... as they dispense the water.

...And are there some problems with you disbursing this money at the end of the month? Are you on time?

I would say we are on time. There are some delays of course. It is not immediately at the end of the month they get their money. It would probably take some time but in between disbursements it should take 30 days. So the

last time they got the money to the next disbursement it should take 30 days.

What problems do you face with the day to day operations of the water kiosk?

In Kanyama, the major problem we have is the power outage. When we have no power it means that we have no power at the production wells; means that the community also ends up not having water. So, we have reduced sales - that affects both our selves but also the vendors because at the end of the month they have reduced income. That creates a situation where the vendors in the long-term deciding to leave as they are not making any appreciable income. That is why we encourage them to sell other things other than just water.

Any other problems? There is an issue of low pressure... When I was going around the issue of low pressure dorminated the problems.

That comes back to what I am talking about as power outtage. When there is power outage, it affects the flow within our network. But also because this is the same network that is feeding the heavy industrial area. You can imagine the preference of the water supply... Where there is more money! But in generally, the power outage has really affected us to a large extent. The question also of low pressure arise also sometime because of the network and the growth of the compound. You have a lot of connections coming off the already strained network.

How is the maintenance of the water kiosk system organised and undertaken?

That is done by Lusaka Water and Sewage...

Can you just elaborate a little bit more so that I understand?

I mentioned that the Peri Urban Department is splint into these three Zones. Each Zone from the technical side has a supretendent who is a Diploma Holder and has a set of plumbers or artesans that he uses both for carrying out the repair work in the network but also at the kiosk. For instance, if there is need to replace a tap because the taps are the ones that are replaced often or the meter is clogged, may be gets clogged because of grite from the borehole, the supretendent is the one responsible for that. So the vendor will report the fault and or complaint to our office in Kanyama to the cashier who inturn records the complaint into the ledger (complaint book) and the supretendent picks up those complaints from there. We have a billing system which we have not yet used in Kanyama but ideally when these complaints come in someone is supposed to log them into the system. Materials for carrying out any maintenance and repair works are then drawn from the stores based on the complaint entered in the billing system. So in essence all repair works are carried out from LWSC.

How long does it take for you people to react to a particular complaint?

It depends on the nature of the complaint. If it is a burst pipe it has to be done immediately if information is passed. Sometimes you have a leaking pipe and probably somebody has built a wall very close to or over it, so you have to take some time to tell this person and give them time to either move their structure, demolish or tell them that this will affect their building so you go aheard and demolish that before you carry out your maintenance. Sometimes, some people come to you and and tell you that *'I know I have built over your line but instead of you demolishing the building I would rather pay the cost of rerouting the line'*. So, if the cost is reasonable then they pay and you reroute the pipe.

What are the standards and norms of the operation and maintenance of the water kiosks?

The opening hours, the standard is to open from 06:00 hours and remain open throughout the day. Nonetheless, they break off by 11:30 hours to 14:00 hours and this time is both for their lunch as well as getting to our local offices to remit the moneys collected the previous day in the afternoon as well as the moneys from sales in the morning. In addition, they are supposed to keep the kiosk surrounding and drainage clean and free of any dirt.

What are the monthly average O&M costs of a water kiosk?

I do not have the actual figures broken down the kiosk but it is mostly the major works are the replacement of the taps that wearout and the cleaning of the meters. The meters usually they sit around for almost four year before you can maintain but the taps wearout more often and probably are replaced at most three times a year. To narrow it to water kiosk, probably we spend about ZMK 300,000 per month on a minimum.

What percent of the budget has been set aside for reinvestment?

Not necessarily the water kiosk system. I think the budget that we have is we set aside moneys mostly for maintenance, O&M but very small portion to try to carry out small extensions in certain areas. But that is overall, it could be the network but that does necessarill imply that it is reserved for the kiosks only.

What percent is that?

It varies... but not more than 10%.

What opinion do the people of Kanyama have on water kiosks?

They would prefer to have the connections at their yard, the individual yard connection. But it is just a question of affordability because if they have to have a yard connection then they should be in the position to bear the full cost of laying the network or the pipe up to their yard. But also the price of water, they will have a monthly bill and the cubic meter cost of water is much higher than collecting water from the kiosk.

But you are piloting the pre-paid, can't that service be extended to individual household connections?

It will be as we have also been piloting on individual household connection but not in the informal settlements. We have been doing that in the low cost of Libala. That is the decision we have taken that we will be installing pre-paid water meters but the cost of pre-paid water meter is significantly higher than the cost of the conventional water meter but our idea is to go to the pre-paid meter system because that also reduces on our staffing over the meter readers and so on.

How relevant do you think the water kiosk will be in the future given that improvement in the general income as well as the general lifestyle and the wealth of the people in Kanyama?

The closed kiosk system will perhaps continue operating as a kind of kiosk where other things are sold but the open one becomes basically of no use as more people get to have yard connections because they can afford it. Then we shall have less people wanting to got to draw water in their containers over some distance.

What measures have been developed to ensure that water kiosks remain relevant even in the wake of improved income, general lifestyle and wealth of the people?

Initially the kiosk setup has a short-term solution to the supply of water. Even the budgeting is clear that it is short-term. The only measures that have been taken to ensure that they are relevant is rather than build the open kiosk you build closed kiosks which kind of continue to operate as shops for other groceries or other small things. Because definitely even if people's income improve, you probably still want to buy a few things from some shop that is nearer to your house than walk to a super market of shopping mall.

How do you forsee the future of kiosk system in Zambia and how will such a system be sustained?

I think it is a good solution for very poor areas as a means to provide safe water as close as possible to the residences in these areas. But I also see it as a kind of service that people will only associate with the poor and as people's income improve people will not then want to be associated with that and would rather move away from that.

If you had an opportunity to improve on the current water kiosk system, what is it that you can change and why?

One thing that we are trying to introduce is the pre-paid meter that I talked about so making sure that the facility is available even when the kiosk is closed. But also, i tend to think that the Regulator looks a little bit further into having a tariff structure for really poor people because we get a situation in these areas where they are people that cannot afford - they are very elderly person and may be the person they depended on passed on and so they are basically leaving off neighbours, the churches and any good-will person and so I think we needed a structure or tariff that then allowed for - some kind of social tariff and that probably need to the accompanied and cushioned against that by government to some extent. But that is not in existent.

...I agree with you, that is why I am saying that the Regulator needs to come up with a tariff purely for the poor that is then subsidized by central government or the social system... If I had a way, I thing we will do away with the kiosk as the people that supply water and just tell people to look for the money for the yard connections. But what happens if such action is taken, people that can afford starts reselling water and they would sell at very high cost. Thus in order to curb this, the Regulator came up with this bucket concept as a minimum dispensing volume and hence the basis of the tariff...

...It is also the Regulator's objection of trying to sell the water at higher costs than those being paid by residents in Kabulonga. But my point is, that happens throughout. They pay more in terms of transport, they pay more in terms of getting cooking oil, mealie meal and so forth. So, it is nearly trying to meet them at the point for a specific service required... They make their money on a daily basis and so we are not asking them to pay a bill for the whole month. We are saying, if you want 20 litres pay for this 20 litres now and if you have money for 40 litres, they pay for 40 litres. So, depending on the money they pay per day then they do their budgeting - we have a small portion for water, a small portion for charcoal, a small portion for their tomato, onion and so on and so forth. So we are nearly providing for the price of water that they will need on a daily basis. It is ver expensive for

us to operator. It would have far much cheaper if they had the yard connection because we would done the monthly billing.

I want to know about the basic drinking water standards in Zambia, do we have any?

Yes, we have the existing water standards and these are set by the Zambia Bureau of Standards (ZABS) and they specify the quality of water and also specify the process of testing the quality of water.

Yes the quality, I am looking at it in terms of quantity for example per person what is the recommendation?

It depends of the usage, if I may put it that way. For the rural sector it is 20 litres per capita per day; for the informal sector in the urban area it is 50 litres per capita per day, and it graduates just like that up to the high cost which is 250 litres per capita per day.

What are the roles of these vendors?

Their role is basically to dispense the water to the customers at the set price. They do not vary the price. They have to sell it at the price we tell them to sell it at. That assures the uniformity and that the people do not get exploited. But also we use the vendors as the means of sending out information to the community. If for instance in the rain season, the waterborne disease update; the alert go quiet high so we use the vendors to tell the people on how to store water, making sure that if they are drawing that water they should clean the containers. Sometimes we have a situation where we have to dose the household chlorine at the tap, we give the household chlorine to the vendor so every person that has to draw water in the container, the water is dosed with chlorine. That is just to protect the water on storing and not necessarily that it has to treat that water - it has to protect the water as it is stored in the house in case it come into contact with organic material.

How is the water supplied to the water kiosks?

It is from our main distribution network. The kiosks are connected off our main distribution network, the same distribution network that supplies individual household connection. The main source is actually boreholes that are along Mumbwa Rd, near Kanyama itself.

Is it treated?

Yes, the water is treated. There are inline chlorinators. It is basically disinfection.

How much rent is paid by the water kiosks vendors for the use of the water kiosks?

No, they do not pay rent. As I said all the structures belong to Lusaka Water. We encourage them to sell, especially for those in closed kiosks the ones that look like houses, to sell other things apart from water as a way to supplement their income.

What other services are paid for by the water kiosk vendors from their own finances?

Like I said they may probably sell things like sweets, cooking oil (small packs), cigarettes... just the small things that people in the community would be selling. Most likely not everyone sells other things other than water. They run it like a small grocery shop.

On an average, how much water is sold per day?

It varies quiet widely. I have to check that... #00:00:00-0#

How much money is realized on average?

Some kiosks go to like ZMK 1,000,000 on average while others go to may be maximum they get to something like ZMK 200,000. It depends on the location.

What type of understanding exists with the vendors?

We have drawn out a contract, quiet elaborate. What expect the vendor to do; how they are expected to behave; what they expect to do and what they are not expected to do. The contract also contains clauses on what the company is supposed to do so that the vendor does not take basically all the responsibility.

What kind of assistance do you render to water kiosk vendors?

In terms of...?

Any kind of assistance. For example when you talk about encourage the vendors to sell groceries or merchandise, using kiosks as selling point. As there are no mechandise in the kiosks and I was told they are treated just as contracted people and they have to look after themselves. Is that correct?

That is correct. Other than just the commission paid. As I said, they are just the sales people at the end of the day.

What type of major service interruption are usually experienced with the operations of the water kiosks?

The major one is power outtage as I have mentioned already. The other one is a burst main or a broken main that would definitely have direct impact on supply. But also the contractors, we have all these road works going on so we have incidences of the contractor reaping off our pipes due to heavy machinery then we have to shut down and attend to the repair works.

What design and construction issues do the water kiosks have?

The geology of Kanyama as you noticed is mainly dolomite so in terms of construction that possess a challenge when they are digging - they have to blast the rock. The major cost is blasting, breaking away the rock. That is also the major cost when you are laying the pipe network. Just to give you an idea of what we are talking about, we have on average between 80-90% of rock to every cubic meter of trench that you are making. So, the cost of the pipe materials is nothing compared to the cost of trenching, blasting.

What measures have you put in place to resolve these issues? Basically you are saying the geological formation in Kanyama is the biggest construction headache, but are you happy with the way the kiosks are designed and constructed?

Well the design came from us and we are happy with them... We are happy with the design. Well the other issue, which has nothing to do with the kiosks, is the planning, the unplanned nature of this area that causes a challenge in laying lines. You find that sometimes you have to run the lines longer just go go around certain properties and hence the costs become much higher. #00:00:00-0#

Are there measures that you have put in place just to try to resolve these issues? #00:00:00-0#

Like the unplanned nature is the city planning issue which is sitting in the municipality so there is little we can do to influence that. The least we do is to have discussions with the landlords, the owners of the properties, if for instance we have to pass a line through their yard. We negotiate with them and as much as possible we avoid having to pay someone laying the line through their yard.

What other solutions are there in the delivery of water supply to low-income urban and peri-urban areas?

I think the kiosk system is the best system. It allows people to draw water by the volume, meaning that depending on their income they will as much as they need for household uses. But also we do not burden them with the bill that comes every month because they used more than they needed and also it is pre-paid. So the people have to have money upfront before they can access the services.

Thank you so much Mr. Mayumbelo.

My name is Sankwe Kambole. I am doing my Masters programme at IHS Erasmus University Rotterdam. I am dealing with basically the specially called Urban Infrastructure Management and Energy and I am very interested in looking at the financial sustainability of water kiosks and having read something about water kiosks I know is it one of the methods the government is trying to extend supply of water to poor urban areas where there is no water connection. This is basically how I came up with this topic on financial sustainability of water kiosks in Zambia, and I am specifically looking at Kanyama. I am aware that DTF funded Kanyama and 18 water kiosks were constructed. It is from the point that I want to find out the involvement of the DTF vis-a-vis the management of water kiosks up to procurement to delivery of the water supply. I also expect to talk to the community to find out if they are happy with the tariffs so that I can come up with an acceptable model for financial sustainability of water kiosks. Thank you very much for accepting my appointment and consequently my talking to you. So, I have a number of questions and these questions range from various aspects and if does not involve you just state that. So, my first question is:

What were the total costs for the construction of the 18 kiosks in Kanyama?

Kiosk construction comes with other infrastructure that have to support the kiosks construction and these include the network that will also to be constructed; apart from that administrative costs for managing the project - we support the CUs and the Project Team in ensuring that there is efficiency. We buy equipment for them; the computers, printers, sometimes photocopying machines, etc. - just to support the project implementation efficiency. The total project cost for Kanyama was about ZMK 1.1 Billion that is inclusive of the entire infrastructure, the pipes, and kiosks and so on.

Is it possible for you to just break down this amount very roughly into the percentage? How much went into infrastructure and the network and how much went into the admistration, supportive fund for the project implementation?

I think the cost drivers are the infrastructure (network and the kiosks) which takes about 90% of the total cost. I think what goes to the administrative costs is about 10% of the total cost.

How is the construction of the water kiosk financed?

What we do is, we actually first issue what we call as 'A Call for Proposal'. This is a window where the CUs are allowed to apply for money from the DTF. The CUs then apply for financing of areas of their preference. The proposal is the submitted to the DTF; the evaluation is done and the accepted projects are communicated to the CUs. A Financing Agreement is then signed between the CU and the DTF and the money is disbursed to the CU. We use the imprest form system where we disburse advance to the CU and upon spending about 50% of the advanced funds, the CUs retire the imprest to the DTF and consequently the retired imprest is replenished. Upon the completion of the project, all expenses are retired and should there be any unspent moneys, the CUs need to transfer such unspent moneys back to the DTF. The CUs are then required to submit a final project completion report before the project can officially be closed.

What are the sources for these funds?

We have our basket fund partners. These are the KfW, DANIDA, EU, AusAID, Zambian Government and technical support from GIZ.

Basically you financed the whole Kanyama project (ZMK 1.1 Billion), I am interested in how much GRZ puts into this basket fund?

Two things, starting with the financing of the Kanyama project. Kanyama project was financed slightly different from the way we finance other projects. The people of Kanyama had suffered quiet a lot in terms of inadequate of supply and poor sanitation, and on their own they had started something to try and see how they can improve the supply. So there was a component where the people themselves had actually helped in terms of excavation. Kanyama has a rock bedding and that is one of the major cost component in terms of construction, when you talk about Lusaka, is rock blasting. So the people themselves had started excavations, rock blasting using ordinary methods although DTF later came in and helped by acquiring the blaster. But if you calculate this in terms of the costs, there was a contribution from the community in terms of labour costs.

Government support to the DTF comes in form of counterpart funding to the financing agreements signed with our DFTs - basket fund partners. We also present budgets at the beginning of the year and we are being supported through budgetary support. We are also being supported by MLGH. So, two components: counterpart funding and through normal budget support.

So, this counterpart funding is there a threshold? Is there a minimum?

There is no threshold except that this is usually a bilateral agreement between various countries and

governments - others is 5% while others is 10%. As DTF we do not have control over this because this is a bilateral agreement with the various governments, so sometimes it is 10% and sometimes it is 5% so there is no threshold but depends on what government agreed.

So, if I said that this counterpart funding ranges between 5% and 10%, would I be correct?

I would not know because at some point it was also 15%, so government does negotiate - depending on the negotiation. There are times for instance these counterpart funding are agreed and where sometimes where government does not meet its obligations and sometimes the donors actually come up to fill the gap. So, it is not an issue which you would say there is a threshold, it is literary an agreement between government and bilateral partners. Others have supported the DTF 100% without requesting for that counterpart funding. So that is why I do not want to say that there is a threshold because it starts from 0 to something but usually does not go above 25%.

Who owns the water kiosks?

The kiosks are actually owned by the water company, the water utility. The money which the DTF gives to water company is grant and there are actually on the asset book of the water company - so, they are purely owned by the water utilities.

So they are grants and not loans?

There are grants.

What are your roles in the water kiosk system?

Let me start from the background, from the time that the DTF was formed. When the 1997 Water and Sanitation Act was passed, NWASCO was mandated to create a fund that will assist the Commercial Utilities extend services (water supply and sanitation) to the urban poor. The government realised that the services levels in the urban poor were very much behind the already existing high cost or medium costs areas. The water companies when they were commercialized, they were supposed to operate commercially so that they could earn enough revenue that could be ploughed back into infrastructure and service delivery. Unfortunately, CUs were not interested in these low income areas because of complex issues related with the service provision - issues of vandalizing; issues of non-payment; issues of technology to supply water - so there were all these complex issues that made the water utilities reluctant into going into the urban poor. So the government thought that the only way to help or mitigate this was through creating a fund that could give grants to CUs so that they could improve the service provision in peri-urban or low income urban areas. So our role is to assist CUs improve service delivery in low income areas. We are purely a basket fund financing water supply and sanitation projects for the low income area. That is our role. What we do sometimes is also assist the CUs in coming up with the right technogy for service provision in the low income areas because you must understand that for instance the nature of housing in these areas is different from the high cost areas - people do not have systems so that they can have individual connections or people to not have toilets inside - so how do you actually provide a service so that at the same time the CU gets revenue for the services it is providing. So there are two aspects, we provide the funds but we also provide technical support in coming up with the right technology to ensure that the services that we are talking about is provided, at the same time this service provision does not become a burden to the CU or a liability where the CU starts losing money. Somehow, the CU must be able to recoup the cost of maintain the infrastructure.

What are the management systems that have been instituted in these kiosks and what type of management structure is in place?

There is a requirement; it is a prerequisite to actually providing funding that a CU should actually form a Per-Urban Unit, a Unit that should actually be responsible for managing the water supply scheme. There is a difference between supplying water to a house in Kabulonga and supplying water to Kanyama because when you are supplying water to Kanyama, you need close management of the system. For example the kiosks will need attention: it will need to be painted; you need to repair the tap; you need to ensure that the vendor is managed; that you are collecting the money - there is a lot that needs to be done. You need to provide security and so and so... there is a lot that needs to be done and so there should be a lot of interaction between the vendor, the community and the commercial utility. Because the vendors are coming from the community, so these are the people that have to be managed in case something does not work out; in case someone is not paying the money; there should be someone who happens to be responsible - the community must be involved to ensure that the right people are chosen - in training the people and so on. Now if you put a meter in Kabulonga, you just have to put a meter and that is the end the only time you go back there is at the monthend to read the meter but in Kanyama there should be constant monitoring of what is happening. There is a Peri-Urban Unit that is actually formed, that is firstly and secondly there is this arrangement that is talked upon where you have a contact time with the vendor when moneys are collected. There are two systems of collecting the money: One system allows the vendor to hand in the money every day at the end of the operations day - once you do the sells you actually

hand in the money or once a week when the money is collected because you read the meter and compare how much water has been sold and the vendor hands in the money and at the end of the month then the commission is calculated based on the total sales - you have to compare with the volume, so the meter must always be functioning that is the basis for actually knowing the quantities and then you calculate the commission and you pay the vendor; the other system allows the vendor as an end connection. So what you do is that at the end of the month you read a meter and issue a bill to the vendor of the total monthly sales less the commission due to the vendor then the vendor pays you the bill. So there is this arrangement where there is someone monitoring what is happening so that in case the meter is faulty someone should respond immediately otherwise it will be very difficult to know how much water you have sold.

The tariff structure is actually that the normal tariff structure must apply for the water kiosks just like for any other water supplied to other areas. CUs submit the tariff structure approval to NWASCO. Some CUs have set a structure for kiosks and we are actually not involved in that; it is up to the CU and NWASCO but all are within the minimum band - they are the rising block figures but the kiosk tariff structure is usually in the minimum band.

What regulatory framework is in place for water kiosk system and what does it involve?

There is no regulation per say because a kiosk is just like a standpipe except that it is much more developed to try and improve the environment from which people are getting water supply; environment for the vendor and now the vendor come rain, come snow, come sunshine the vendor will be in a secure place where they can still sell water. Whether it is raining, it is windy or sunny the people can still have access to water supply. If the vendor has a child, the vendor can come with a baby - put her in the kiosk - and they can even cook from there if there are late interruptions. So, there is no regulation persey except that we have design standards, i.e. in terms of design there should be a minimum of two taps, maximum of three taps, the other things are things like security for example, the things that we have already talked about; you must have vandal-proof structure. That is the standard in terms of design but it is not cast in concrete, there is no regulation that you cannot put a kiosk here and there. Unless may be when it comes to kiosk siting; you cannot put a kiosk close to a public place like a drinking place, a bar; the radius should be about 500 m from the other kiosks; you cannot put a kiosk at a garbage waste dumping area. So those are the major important things that we look at - it should not be located closer to a drinking place (a bar); must not be closer to any dumping place and the radius, walking distance for anyone getting water from the kiosk should be at least within 500 m. But these issues we have talked about, for instance the radius of 500 m are also subject to changes. For instance, if you go to a peri-urban area in the rural area, the plot sizes are relatively big but within 500 m in Lusaka you can have more than 2,500 accessing water at the kiosk whilst within the same distance in the rural setup you can only have probably 400 people. So, sometimes you break these rules because you are also concerned about the income for the vendor. It is not just about the people getting a service, it is also about a person who is going to sell water so you tend to reconcile and come up with a middle range.

What is done with the money that is realized from the sale of water from the water kiosk?

It goes through the central treasury of the CU. The money is just like any other money the CU collects from the sale of water to any other customer. So it goes into the central treasury. That is why we also insist that the kiosk billing system must also be embedded into the CU's main billing system to allow for efficiency monitoring and so on so that it is just part of the overall billing system of the company. So the money goes into the central treasury.

What problems do you face with the day to day operation of the water kiosks? Where do your responsibilities end?

Once the project implementation is completed and the completion report is issued there is what we call a monitoring period which takes about two years where we monitor the operation and management of the water kiosk system and we have noted quiet a lot of challenges and problems associated with the management of the kiosks. One is income in the kiosk. The kiosk can only survive if the vendor is selling enough water to make a living. What we have discovered is that towns along the line of rail have more sales because of the populations, there are more people. So you find that the sales in terms of volume of water is high so they take reasonable commissions, thus the vendor can stay all the time at the kiosk. But it is different from the kiosks that are for instance outside or semi or rural areas where for instance the sales are very low. Now if the commission is very low, the vendor cannot survive by actually depending on the commission. So, there you find that it is very difficult to get the male vendors to work in kiosks because they need actually to supplement their income. If for instance they are making ZMK 50,000 per month that is not enough to support their family but for a woman who is supported with some income coming from the husband can manage, apart from selling other small things. So the income is a crucial aspect and when we are doing our evaluation there is a lot of data that we do collect to determine the income for the vendor - depending on consumption; depending on population and so on and so forth. We do a baseline survey and compare with the existing scenario - another source of water, the existing sources of water - and we can calculate and project the income for the vendors. If the income for the vendor is very low, then the kiosk system is not viable and we would rather have individual connections given to the people. Secondly, it is maintenance: kiosks needs to be maintained. You need to actually ensure that the taps are maintained because if the tap is leaking, that is water passing through the meter, how will you know that the

water has gone to waste or the vendor has just stolen some money? So, the meter must be functional. There are lots of things which in terms of maintenance are very important. Security: you must ensure that for the vendor to work the place must be secure. We have done that in the design because kiosks have concrete walls and the doors are steel but they should be provided with proper locking system so as to allow it to be vandal-proof. It is important to also realize that between the kiosk and the CU there is a person there and that person needs to be managed. Sometimes people go away with money - they do make the sales and the run away with money - so it means the CU has lost that money. So those are the challenges that we do have with the kiosk system. The other one is the availability of the water supply. There may be people to buy the water then the CU is failing to actually provide the water. So you find that the vendor will take more sales if the water supply is adequate. Because what people do is that if the water supply is not adequate they look for other sources so the vendor losing out on money.

So, if I may go back on the issues that you monitor in the 2 years after you hand over the project is the INCOME; then the second thing is MAINTENANCE - effectively having a functional meter because that is the sources for the money and accountability and others…

Including the surrounding. We have the drainage system that actually allows all the water draining from the kiosk to be drained to some safe place so that we do not to allow ponding around the kiosk because that become a breeding grounds for mosquitoes. So, the maintenance is quiet broad: Having the infrastructure painted; locking system; the taps are ok; meters are running - everything is done, surrounding and so forth and so on. It is quiet broad.

...the other issue is SECURITY although by your design you have incorporated the concrete roofs and steel doors...

But the CU must provide the locking system - padlocks so that the person who is selling goods in their should not be removing the goods all the time he/she knocks off and takes them home as they will probably increase the chances of being mugged (attacked) and most of the people will not actually sell the goods in the kiosks if they feel that their goods are not safe.

...and the last one, the fourth one is the AVAILABILITY OF WATER SUPPLY

Exactly, that is very important because in some cases the demand on the kiosk is so high that the CU actually fails to meet the demand. The kiosk is designed with three taps so that it takes only 20 seconds for someone to fill-up the bucket, that is the design - meaning that in the design for the kiosks we designed that one kiosks should be accessed by 1,500 people maximum and the minimum of usually 800 - minimum 800 and maximum 1,500 but we are comfortable if the range is between 1,200 and 1,500 people. But the problem is that you cannot get such population in rural areas so we go to the minimum of 800 people per day. That is the number of people that should be able to access water from a kiosk per day.

So, if you are calculating for instance the total sales it will be: 1,500 people x 10 litres per second *[Q, Discharge]* x 10 litres *[per capita consumption]* x 30 days then you calculate the total volume and then you compare with the tariff. If the tariff is ZMK 2,000 per cubic meter then you calculate and you know the amount of sales and you can also estimate the commission for the vendor.

In your various monitoring periods that you have had and specifically to go to Kanyama, the area I am interested in, what opinion do the locals have on the kiosk system? #00:10:00-0#

It is quite interesting in the sense that when we started the Kanyama project most people actually did not like the idea of kiosks. They thought that we are actually demeaning their status. They wanted individual connections rather than kiosks where they have to walk and fetch water. But I think from our understanding and the research that we have done, we realized that apart from just constructing the kiosk we needed to lay the networks and for Kanyama it has actually 100% network constructed. So, anyone who wants individual connection can apply to the CU and the design capacity is actually adequate to take on individual connections. But let me tell you this that we were so shocked that 3 years - 4 years down after we have constructed the kiosks and put the network, very few people have asked for individual network connections. The reason is simple, most houses in Kanyama are rented out - they construct these blocks of flats where there are several people in there. So when they have individual connections the responsibility to pay for the individual connection becomes a problem as there is high turnover of tennants - going in the house and leaving without paying the bills, and so on - so you find that connection after being disconnected by the water utility company becomes a problem. So normally what people prefer is to go to the kiosks because at the kiosk there is reliability, the kiosk will not be closed. Therefore our findings with working with kiosks is that where there are a lot of property on rent, people prefer kiosks and where a lot of people own their own houses they prefer individual connection. The responsibility for paying for individual connection in the case of Kanyama is compromised by of the number of different families living in the single housing unit - the lowest number of families living in a single housing unit in Kanyama is 5 families with some houses having as many as 18 families - so in this case who is going to be responsible for ensuring that they pay for that individual household connection? In addition, there are people who only stay in a house for a month and they leave and

they have been using that water, which is going to pay for their water? So, what landlords prefer is for the tenants to go to the kiosks. So, we have realized that depite having done the network - because we call it a mixed system, kiosk and individual connections - but still people are going for the kiosk because maintaining an individual connection is a challenge for the households.

So, how relevant will the kiosk system be in the future given the improvement in the general household income as well as the general lifestyle.

Everything has time and everything goes with time and thus the status core must not actually remain the way it is. The people that have own houses in Kanyama today are leaving those properties for their children and the children would want to improve their lives, they will not leave like their parents. That is noted and we have reduced on the number of kiosks that we are now constructing because people are improving on the type of houses they are building and their lifestyles are improving and people are preferring individual connections to having public stand taps and because construction materials are becoming cheaper so people are preferring putting up in-house water and sanitation facilities because it is now affordable. So the relevance of kiosk over time is actually diminishing overtime. What we have done even in our projects is that we are reducing on a number of kiosks that we are putting up.

Having said that what measure have you put in place to ensure that the relevance of the water kiosks is maintained in the future despite the increase in income, status, wealth and lifestyle of the community?

I tell this, when things evolve you cannot stop, I mean you cannot actually make kiosks relevant. What we have done is that in future, we might not need for instance vendors. We might try and see how we can construct kiosks that will allow people to get water using cards (tags). So, we can just have one kiosk, two... and for those that will want to get water from the kiosk they will top-up on their cards and get water from there because very few people will actually get water from the kiosks. The relevance of kiosks has two components: one is service provision and the other one is vendor commission which is very important. Therefore by using latest technology where you can actually buy water through a card (tag) system then you actually remove the component of the vendor commission... So, that is what we are doing, using technology to still get water to the people because even as far as we know now there is a lot of improvement in the lives of the people but we still have poor people that still need to access water from the kiosk. But we know that the kiosk system at some point might belong to the past with the improvement of the housing. As for now, we look at the needs of the people because we see that the current scenario in Zambia and the current level of people in the urban poor still need the kiosks, somehow.

If you had an opportunity to improve on the current water kiosk system, what is it that you can change and why?

I think the first thing, particularly in some areas, is removing the aspect of the vendor so that we do not have the vendor particularly in areas where the sales are very very small. That is one aspect. But what we know is that in highly populated areas we still need vendors because we are creating employment to a lot of people. Those are the only two things that I can talk about: we need the vendors because we are creating employment but in areas of extremely low sales, we need to replace them with the vending machines. The constraint we have is that the accessories that come with the vending machines are very expensive. We tried one design, for instance the tag for loading water or money was costing about ZMK 50,000 to ZMK 70,000. Furthermore, what we have noticed is that the systems of using tags or tokens as the case has been in Chipata, Eastern Province, these tokens and or tags go missing and one has to pay ZMK 50,000 or ZMK 70,000 for replacement - if a family or someone loses that, who pays for that if people are failing to day to pay for water for ZMK 15,000 or ZMK 20,000? So, what we are saying is that the technology must improve such that the card system or whatever the tag system must be cheap enough so that the CU should not have problems in replacing such cards - for instance if the card is costing ZMK 1,000 that will be fine! Since the family can lose this today but will be able to pay ZMK 1,000 and have the card replaced because if you have a vending machine and the family has no card and or tag, then they will not have any access to water. And these are social cohesions which are in the compound where it is difficult for a family to go to the other family... 'Can I have water, I will give you the money?'. How will they calculate the charge? And this will actually bring up conflicts in the social setup. So, those are the things we are talking about: One is improvement in the technology that is cheaper to replace the card system. For example, if I lose the bank card I do not pay anything but the bank knows that they are able to make money through the service charges that I pay - they know that they are able to get back their money… but what about the water vending system? What we realize is that no one can afford ZMK 60,000 as these cards and or tags are easily lost and they have to pay ZMK 60,000 then it is not worth it.

What are the roles of the water kiosk operators?

The kiosks are actually operated by the CUs. Now, we have what we call as a kiosk management system which we developed as DTF in collaboration with the CUs. This management system entails that the CU hires water vendors to actually run the kiosks on their behalf. There is a commission system which is dependent on the water sold; the contract allows the CU to pay the vendor on commission, on an agreed percentage - the more water you sell the more money the vendor makes - that is the arrangement. The CU owns everything. The vendor is

engaged. Contract is signed and then the vendor sells the water on behalf of the CU and is rewarded through a commission. These commissions percentages differ from one city to another -- for example is the per capita consumption, that is based in terms of perception in the area is higher, then the commission is actually slightly lower ~ 30% but where you have the per capital consumption of say 5 litres per person per day then you have a commission which is higher to allow the vendor get some kind of reasonable income. For example were the vendor is making ZMK 100,000 per month, then it means if you are giving the vendor 30% then the vendor is getting only ZMK 30,000. Now, where you have high consumption, the vendor will get more money because the calculation is based on the volume of water sold - so these commissions differ from one city to another.

What is the basic minimum standard of drinking water in Zambia, is there a minimum that is set?

I do not think there is a minimum because Zambia as a country is divided into three categories of residential standards: we have high cost, medium and low cost. Therefore the water requirements in these three categories are different. From our studies that we have done and for the area of your interest (Kanyama), the area is low cost and the basic minimum differs between households with own connection and those with public connections. Public connections in this case might mean stand pipes or might mean kiosks. Our studies have shown that for kiosks, the per capita consumption is as low as 5 litres per person per day. This can be translated per household, thus a household in Zambia has typically 5.5 persons. You have to note that for other household chores other than for cooking and drinking, people get water from elsewhere. You find that water for bathing, people go and get it for instance from shallow well. Water for cleaning, bathing and washing utensils is still collected from shallow wells but water for cooking and drinking they actually get it from the kiosks. This is what makes us arrive at 5 litres per person per day but there is also this other aspect of people using water from other sources which might increase the 5 litres per person. Now, in Lusaka where people do not have access to any other source but they are getting it from stand-source or public supply then the per capital consumption is between 25 and 30 litres per person per day. Then you can multiply that by the average household and then you can calculate the average consumption. That is what we calculated for Kanyama since you are dealing with Kanyama - Kanyama is between 25 and 30 litres per capita per day. For the updated average members of the household, you need to check the Census 2012 Report but at the time we were undertaking our survey we found that the average members of the household were 5.5 members per household.

So, there is actually no legal statues and or provision that state each person should consume a given amount of water per day?

There is nothing like that. I think the legal requirements if you get from NWASCO has to deal with the quality of water as well as the service guarantee. There is a legal requirement for service guarantee, i.e. How much time should someone have access to full water supply. Those legal requirements you are going to get them from NWASCO. So that means that if the service guarantee states I should have access to water for 8 hours then water needs to be available for at least 8 hours and regardless of how much I use. There is no legal requirement that states you should be provided with so much water in terms of volume, No! But is is the time in which you have access to water, and this differs from area to area.

Do you know if there is any rent that is paid by the water kiosk vendor for operating the water kiosk?

No rent is actually paid. In fact apart from that we allow the kiosk vendors to sell other merchandise to keep the kiosk vendor busy. The kiosks are designed in such a way that we also have shelves offering other goods that are seen to be on demand within the community. So, no rent is paid.

What kind of assistance do you render to kiosk operators?

The DTF does not render any assistance to the vendors but we encourage the CUs to render help to the vendors, for instance, startup capital for trading. A lot of CUs have done that where they have provided moneys for vendors to actually startup a business utilizing the kiosk as a trading point for any other merchandise. Apart from that DTF only provides funding for training of the vendors before recruitment. For those that are recruited we provide funding for their training - because they have to be trained in various skills for instance business skills; accounting skills; social skills because they all come into interacting with a lot of people and with the advent of HIV and AIDS issue has become very key and we have included that component in our training because a lot of young girls once they become vendors become centres of attraction for men. Those are the issues that we assist but we provide money to the CUs and the CUs provide all those things like capacity building, the training and everything. But in terms of providing startup capital it is only the CU that does that, we do not do those ourselves.

What type of major service interruption is usually experienced with the operations of the water kiosks?

Usually it is just availability of water supply. Secondly, there is always an agreed schedule of times that the vendor has to be available at a kiosk, that is pick time of demand for instance in the morning. Normally what happen is that the vendors, the CUs and the RDCs or any community organization or leadership involved in management of this kiosk is involved in determining the schedules in terms of availability of the vendor at the kiosks in terms of the sales of water. So, they agree for instance that the vendor should be in the kiosk from

08:00 hours to 12:00 hour; 12:00 breaks of for lunch and comes back at 14:00 hours, etc. However, some communities have complained about the vendor being away for longer periods of time than necessary - where the vendor closes the kiosk at 12:00 hours and he/she is supposed to come back at 14:00 hours but stays away longer than necessary. Those are the major interruptions. So, it is purely vendor availability and secondly water availability.

So having talked about some aspects of the design of the water kiosk like vandal-proof, are there any other design and construction issues that affect the current water kiosk system?

The others are very detailed designs which you could only appreciate upon seeing the kiosk. The first is the type of drainage system that has been developed over time which allows somebody to collect water without actually blocking the flow of the water. Secondly, the kiosk allows somebody, even a small child to lift the bucket of water with little assistance from people around. The kiosks are actually constructed with two fetching bays. One is a lower bay where a person first puts a bucket and fills the water, lifts the bucket to the next bay and then lifts it up onto the head because lifting it up from the lowest point becomes difficult for a woman even for a child but if you put the second bay where you lift from the first to the second before lifting the bucket on the head it becomes easy. So, those are just the features that have been developed...

So basically you do not have what we could call as the negative design issues with the current water kiosk system?

We cannot say that we do not have negative design issues because what you see as positive today, tomorrow you may see it as negative. I mean, the first kiosk we designed we thought it was ultimate but we realized that it had flaws so we kept improving on it. Even this time, I cannot say that there are no negative design features as they might be there - tomorrow someone may come and talk about those aspects.

But the underlying issue is that you are always improving on the design...

Always improving on the design.

Although this is not part of my question but it is just interesting to know what you are thinking on the future of the kiosks. Since you have technical assistance from GIZ, is it not one of the opportunities you can use for them to look at the system and see how they can localize the technology so that it becomes cheaper in the wake of high replacement costs?

The efficiency is developing up technology is normally done by the private sector and not GIZ. GIZ can facilitate but usually it is the private sector, and the private sector is looking at turnover, the profits. Let me give you an example, we have actually tried to come up with three types of kiosks that we can put up and once we know that the kiosk is no longer relevant, just bring it down and take it somewhere where it is needed. But the private sector that we have approached are asking for numbers... if I develop the molds for this kiosks which is quiet expensive because the thinner the material - because they use a lot of technology to what we call two-stage reinforced concrete - and it requires the designer to come up with the machines to fit what we are designing and development of that is very expensive... We are constructing about 30 kiosks every year and who would want to invest in that technology for the 30 kiosks. It is different from toilets in that each house needs a toilet and we are able to get the numbers... When it comes to the kiosks, which is a challenge. We have been thinking about the prefabs but it will not work because no one is willing to invest in developing the molds because of the low numbers of the kiosks that we are constructing. Because when we are saying that a kiosk must serve 1,500 people if it is toilet you must divide 1,500 by 5.5 and that will be the number of toilets in one kiosk, which is the difference. So, as far as we know GIZ can facilitate but normally it is the private sector that has money to invest, that has the time to invest and the private sector is looking for profit margin, once it is viable they can go and once it is not viable, forget it!

Well, I think I have been enlightened. Thank you so much Eng. Mulenga for the opportunity to have shared your knowledge with me and this is where I end with my interview.

Thank you very much for the time you have given me. My name is Sankwe Michael Kambole. I am a student at the IHS of the Erasmus University Rotterdam, the Netherland. I am here to undertake my research, collect data. I am working on financial sustainability of water kiosks. I am specifically looking at water kiosks in Kanyama, Lusaka. There are a number of pillars for financial sustainability. One of this is institutional and legal framework. There is also the pricing of water itself and I am also looking at customer satisfaction. So, for customer satisfaction I have a specific question for the household and then for legal, institutional and pricing I have a combined interview schedule for the institutions namely DTF, LWSC and you the Regulator (NWASCO). I have a number of questions and where it does not link direct with you you just have to let me know. Nonetheless, I will need as much as information as possible so that I will be in the position to understand as much as possible the operations of the water kiosks.

How is the construction cost of the water kiosk financed? What are the sources of these finances?

As I said, I mentioned to you, we have got the Devolution Trust Fund and purely it is a basket fund meant for the urban poor. It can go for other things but its primary purpose is to finance water supply to the urban poor, of course even sanitation not just water supply, but also sanitation. DTF has got a number of guidelines and of course MoU with different cooperating partners. At the moment we have the European Union putting money in the basket; we have got the Australian Aid putting their money their; we have got the Germany government putting their money their; we have got also the Government of Zambia putting their money there. Even the Dutch Government used to put their money there but they are pulling out by 2013 out of the country. So, we only have now those Australian Aid, European Union, we have got Germany; Government. World Bank, not yet but we have financing starting in other areas. So, they put that money and this money they issue calls. Now we are on the seventh (7th) call now. That we want these people to make proposals where they want these moneys to could go to. So they want proposals on peri-urban areas and these numbers of kiosks -- proposals are consequently assessed, analyzed and projects approved based on what is found on the ground. So, mainly if not 99%, these are funded by the Devolution Trust Fund. The water company itself if it feels there is need, they can do that on their own but mostly the DTF and in some cases we have got some NGOs like Care International that help and a few NGOs but of course they have to work in partnership with the water provider in that particular peri-urban area. So, there are also NGOs apart from the Devolution Trust Fund.

So, could you know the cost of the construction of the 18 kiosks in Kanyama?

This one, I think they can give you when you go to Lusaka Water. I can have the unit cost but I think they will give you more details on this one.

What is your organization contribution to the total investment cost of these water kiosks?

For us, there was no contribution that we made apart from housing the Devolution Trust Fund.

Could you know what the contribution of Government is?

Okay, this one I can get it from the DTF. I do not know but it could be 5% or less but I can get that from DTF. I can give you that. I should be less than 5%.

How is the ownership of water kiosk in Kanyama township structured?

As I said earlier on, I said if you go into Kanyama, there you have two institutions running the water supply. There is the Water Trust, Kanyama Water Trust and the other side there is the Lusaka Water and Sewage Company. So, where there is a Trust within Kanyama which is Kanyama Water Trust, they have signed a MoU as far back as 2008, April somewhere there. They have signed a MoU or Management Service Contract to say they will be able to report to Lusaka Water as a requirement and some part of the profit will also to go to Lusaka Water. Those are there within the agreement. So in terms of Corporate Governance, they have got a Board, I am talking about the Trust, they have got a Board and this Board you will find that there is a member from Lusaka Water and Sewage Company, there is a member from Lusaka City Council, and there are members from the community, different communities - there are about nine (9) all in all I think I can recall well. So, they have got their own Board; they have got their own management team; they have got their own people up to the venders. So, in terms of ownership, that is how it is under the Trust. They have got their own Board where Lusaka Water sits and Lusaka City Council and others. This is the description for the Trust and that this is the composition of the Board. Then now when it comes to Lusaka side, Lusaka side as I had said, these have been provided for. When you go there, they have got a manager, Kanyama Township has a manager. This manager reports to the Head of the Peri-Urban Area who in turn reports to of course the highest office - The Chief Executive. So, for them the structure is as it is: Head of Peri-Urban; the Manager - the manager of course has his people, they have got cashiers, the have got the venders, everyone. So that is the kind of ownership we see in Kanyama. Unless you have got any questions on that but that….

No, that is sufficient, thank you, and… What are your roles in Water Kiosk system?

As I said, before I even say what I want to say, we have got the Devolution Trust Fund, which is where we are coming from. That Devolution Trust Fund was set up by NWASCO. According to the National Water and Sanitation Act, we were asked to come up with a basket fund and this basket fund is now what we are calling as the Devolution Trust Fund. This Trust Fund is meant to collect funds from different sources -- the cooperating partners and government put funds in the basket and the primary purpose is to extend services to the poor urban. So these grants are given to the Commercial Utilities who in turn construct kiosks. Kiosks for us are intended to be an interim measure because you know it is very difficult to put lines in these peri-urban areas because they are quiet congested. So putting up a kiosk which will cater for so many people, we thought that was a good intervention to cater for a bigger population and if you look at our standards, we have said that each kiosk, if it has got three (3) taps and a tap should have at least between 400 and 600 people and so if it you have got three taps expect about 1,800 people maximum and 1,200 people minimum. So now, there is that aspect of us the Regulator will also take note of the problems and will tell the Commercial Utilities to say look we have seen the problem there can you apply to the Devolution Trust Fund for that but others they would check themselves to say ok we want to see this area to be catered for and whatever but also were we see the need as a Regulator when we are going for regulation will be able to tell them that you need that. But the most important thing is that the tariff, all the tariffs in Zambia are set by NWASCO and that is most critical aspect. But before I talk about the tariff I should also mention that the Devolution Trust Fund we do not interfere in what they do, they have got their own management because we wanted to separate funding and regulation but they report to us regularly just to know what they are doing but they make their own decisions; we do not interfere in their management but in terms of the tariffs all the tariffs that are charged at the kiosks are approved by NWASCO. Now, what you should appreciate here in Zambia is the we have got a National Water Policy and this National Water Policy is framed on cross-subsidy - meaning that the commercial properties have to pay a little bit more; people in the high cost have to pay more than people in the medium cost areas; people in the medium cost should pay at least more than people in the low cost; in the low cost they have to pay more than people in the peri-urban area. So, actually we have got those four (4) categories for the domestic, we have got high cost, medium, low and the peri-urban area and we have also got the commercial property. So what we do for the kiosks, because we want to make sure that the people in the urban poor pay a subsidized amount - they have to pay a subsidized amount, so meaning that, for them what we do is that, our cost structure is a rising block tariff. The first 0-6 m3 you pay actually equal to or less than the cost of providing the service, 0-6 m3, then it keeps rising. You find that most of the people in the peri-urban areas they consume within 0-6 m3 per month. So what we have done is that any unit within 0-6 m3 is less than the cost of providing the service but this is compensated by the people consuming more. So, you find that the tariff is quiet low - it is quiet low - but when the water company is submitting the cost, you do not submit in isolation but for the whole company. So, they can even make a loss in the peri-urban area but it should be compensated somewhere else. All the water companies are supposed to put the all costs together because when you are approving you are approving total cost, including the peri-urban area. So, if they make a loss in the peri-urban area they should be compensated there. But again there is an argument that they may not even make a loss, even at ZMK 40 per 20 litres container of water, If you go out there they will give you details - even at ZMK 60 per 20 litres container - you may say that they make a loss but at the end of the day if you get into details you may find that they make a profit there. What we actually want to do with DTF is to do a study which will look at the cost of doing business in peri-urban areas. We are trying to undertake that study so that we just have to appreciate the dynamics of what happens in the peri-urbans. People may say no it is not very good to do a business study but we want to do a study that will give us the cost of doing business in the peri-urban area but the role that we play there is to ensure that through DTF kiosks are constructed and also we approve the tariff, and those tariffs we have to ensure that they are minimal which should be at or below the cost of providing the service.

What type of the regulatory framework is in place for a water kiosks system and what does it involve?

The same way we regulate any water supply is the same way we regulate the kiosks, except that in terms of hours of supply that is where we have a problem because they can only work from a certain time to a certain time as they cannot be there in the night. So most of the kiosks are guaranteed about 12 hours, and we demand that the minimum should be about 12 hours. There are certain arrangement made between the vendor and the members of the community detailing the times at which the water need to be supplied, i.e. mornings, afternoons and evening. So they go into these arrangements so that the vendor cannot just sit at the kiosks the whole day even in periods of not having any clients coming to collect water but those are private arrangement. But what we would want is for everyone to get water at least 12 hours per day. We just regulate them the way we regulate Lusaka Water - we want water to be clean - and it is just a department, like any other department we expect it to abide to the regulations.

We talked about the tariff structure briefly but we did not go into the niche of saying what exactly are they charging. At this point in time, if you can focus on how much was approved for the water kiosk per cubic meter of water, the current tariff, what is the actual tariff for the water kiosk that is obtaining now?

The actual tariff that is charged is ZMK 50 per 20 litre container of water. It may have been slightly lower than ZMK 50 but because of change and other things you find that they rounded it off to ZMK 50. For them it is like based on the bucket; because for them we have capped them within 0-6 m3. So, the 0-6 m3 is what we have converted into that ZMK 50 per 20 litre container. So for them there are just with the 0-6 m3 and then it stays on a

bucket. So, it comes from there, from the 0-6 m3 then converted it to 20 litres then you get the amount. So if you get the Lusaka tariff, you can even calculate…if 1 m3 within 0-6 m3; say how much is the 20 litres container and then it gives you the conversion… but roughly it is around ZMK 50 per 20 litres container.

Could you know what this tariff entails in terms of operation and maintenance as well as the investment costs? Could you just give me a rough idea if you approve a tariff - if they bring a tariff - do you look at nitty-gritty of saying 20% of this tariff goes to the operation cost and the 50% goes to the maintenance and then the other one is for the investments?

Ok, that is a very important question. May be I should mention two things here. When you go to the Water Trust, you find that there is a dispute already in the sense that for them because they are just Kanyama Water Trust, there is no cross-subsidy. So they have disputed that if you apply the Lusaka Water tariff you may not be able to cover our own cost; there may not even be any investments. So, for them you find that instead of charging ZMK 50 they are charging ZMK 100 for now but that is the dispute that is being resolved now because there is no cross-subsidy. But for Lusaka Water you find that there is cross-subsidy. So, you approve the total cost, how they apportion that is up to them. But if you go to Trust itself, you will find that they have a cost structure - so also the Trusts have also a cost structure. But if you go to Kanyama its self you can ask for the cost structure because for us we approve the cost in totality but in their books when you go to the Peri-Urban Area they will be able to show you operation and maintenance - this is how much but for NWASCO side we approve the cost in totality.

What is done with the money realized from the sale of water from the water kiosks?

This is also Lusaka Water. They will tell you that they have got their plan - approved broader the investment plan. That is up to them to propose and include the tariff.

What are the standards, operations and maintenance norms of the water kiosk system?

I think this one they can still give you because for us what we demand basically from these people are the surroundings of the water kiosks should be clean; the kiosks should have a meter and this meter needs to be read regularly - at set intervals of time; register of supplies has to be kept; kiosks should be well maintained; a price (unit cost of water) has to displayed; kiosk has to be painted. In terms of maintenance you can see that the water is coming from the main city supply line so the maintenance crew has to maintain the water supply network system.

What is the opinion of the users on the water kiosks?

The kiosk system mainly was meant to be an interim intervention because these places did not have water usually and laying (passing) of pipes was difficult and other stuff but with time people with money are demanding that they have their own connection. They would rather have sinks (taps) in their homes and get water from there. Thus, there is an option that is being offered to allow for people that can afford to have household connections. However, in some areas it is very difficult to have individual standpipes. Others have reservations that with standpipes, they cannot afford to pay for the water as it will be expensive in that other people will be drawing water from their standpipes and hence will make their consumption higher of that at the end of the day they fail to pay. Therefore, they found kiosks to offer minimal fees although others with some money prefer individual standpipes. Nonetheless, kiosks will be around for some time to come until the issue of land, i.e. compensation of people with land is addressed. But people are happy; the water is ok but some who have money want individual yard connections.

How relevant will the water kiosks remain in the future given the general improvement in the welfare and income of the local communities?

We are moving towards the middle income nation and as the result the income of the people is improving. As the income improves, we will be phasing them out slowly but that will also depend on the availability of the space (land for laying the pipe network system) - if there is no space, people have no option but to remain with the same - the water kiosks system.

What measures have been put in place to ensure that water kiosks remain relevant even in face of improved wealth and welfare of the people?

The kiosks management in Zambia is a well-structured system and for me because we have structured system in an orderly and logical manner, I am assured of sustainability. Furthermore, some of these kiosks are being run by delegated management and this relieves the increases the monitoring and response to faults as well as complaints as these are detached from the day to day management of the water companies through delegated management and instead managed locally. This concept is being piloted to optimize its effectiveness. So, one important thing is that the management of water kiosks is structured and not up-hazard and that assures the sustainability. Even the coming of income as long as we do not have a lot of debts this system will be a better option, because you just have to push one line and put it there (locate the kiosk somewhere) and people will get

there other than you start passing through people's places. So, because of that you will see that these kiosks will be there forever.

If you had an opportunity to improve on the current system of the water kiosk, what is it that you can change and why?

Install pre-paid meters and make the tags (tokens) available to people because what we want at the end of the day is people to have water for 24 hours. When you can go at any time and draw water, which will be an improvement. But in the current arrangement you find that after 18:00 hours the vendors know off and you have no chance to draw water from the kiosks thereafter. Thus, installing pre-paid meters and ensuring that the tags (tokens) that are given can work on multiple kiosks. Pre-paid metering will be able to solve the problems in terms of when to access water. That is the improvement that could be made to the kiosks but for other areas that have got space and whatever they could be able to run lines from the kiosk network but prepaid metering and availability of tags to the general community will enable people manage the quantities of water at their own conveniences. What we have to move towards is where each customer will have a tag. It is just that may be the price of the tag is a bit expensive and we may not be able to buy now because these tags we will have to buy for them as this is our contribution. So, the operators may the only ones with the tags because of the cost implications but with the improved technology things tend to become cheaper. So is this technology, although it is not very new in the world but in Zambia it is and you find that the cost seems to be on a higher side for most people but with time each one should be provided for with a tag.

So, any other things?

Any other thing that I can say about the kiosk is that it is just important that we undertake the study so that we appreciate the cost of doing business in peri-urban areas so that we can see if we can improve the system as we shall be able to understand the proper management. Thus, the survey in that aspect for us will be important. In addition, the issue of pre-paid metering and making sure that the people have got the tags as this will go a long way in ensuring that the people have access to water every time they want to. It has worked quiet well in Zambia. Others have come to Zambia to learn more about how to do this. For now, it is filling in the gap and hope we continue filling in the gap.

Do we have a standard in Zambia and if we do, what is that standard?

Thank you very much. As I said I am the Chief Inspector. I am the head of the Inspectorate Department. Before maybe I even come into answering the question, I want to just mention to you that we are a Regulator as you have put it and in terms of the work, all the work that we do in Zambia is regulation. So as I said, we regulate all the operation for these water providers in Zambia and for NWASCO we just look at the urban and peri-urban areas, we do not look at the rural. The rural part is looked at by the Ministry of Local Government and Housing (MLGH) under what we are calling the Rural Unit of the MLGH. So basically for us, we regulate all the provision of water supply and sanitation services for both urban and peri-urban areas and it is for the purpose of efficiency and sustainability - those are the critical things that we look at. Now when it comes to peri-urban areas, in the peri-urban areas in particular Lusaka, you find that it is not only Lusaka Water that is providing services in the peri-urban areas. We have also what we are calling as Water Trusts. You will come across these as you move around. We have got about nine (9) Water Trusts and these are also providing in similar way way Lusaka Water is providing water and sanitation services but for them they are coming from a background where previously the NGO has setup schemes and these schemes later on handled over to the community. So to bring them under the regulatory framework, they have signed a MoU with Lusaka Water and Sewage Company and they are calling that a Management Services Contract, so meaning that they are being regulated and not directly by NWASCO but through Lusaka Water. So these are the nine (9) Water Trusts. So in the Township in point that I have mentioned is the township called Kanyama you find that they are two (2) such: One is under Lusaka Water being run by Lusaka Water fully and the other one is being run by the Trust, Kanyama Water Trust. So, this is very import also for you to know. And in terms of what we do at NWASCO, we have issued guidelines for all these water companies - water providers to follow - meaning that if you have got a Trust, whatever that we have prescribed to Lusaka Water in terms of tariffs and everything, all these have to be followed by also the Trust. That is also very important. When it comes to licensing, you know we also license all the water providers in Zambia. So, we do not exclude to say do not take water to this part and that. If we say Lusaka, it is the whole Lusaka as long as it urban; peri-urban. Also in terms of licensing that is what we do. Then there are certain standards that we establish as a Regulator which are like water standards. They are standards that we cannot do like water quality standards, they have got the Zambia Bureau of Standards. So for us the only thing that we can do is to enforce. We can just draw some guidelines so that they can help us to enforce a particular law. So coming back to your first question, I keep mentioning to you that we have got the water quality standards, issued by Zambia Bureau of Standards, and these are enforceable. NWASCO ensures that all the water companies stick to these standards. And on top of that, apart from what Zambia Bureau of Standards have issued, because for them they have just issued the water quality standards - this is what you have to follow… this is what you have to follow - but on top of that we have to issue the guidelines that will support the enforcement and apart from that compliance to quality standards, we have also ensured that you comply to a number of steps that we do. So it is a requirement by all the water providers in Zambia to ensure that they submit to NWASCO all the results of the

water quality on quarterly basis, they have to submit that and it is a requirement that you should have a quality assurance department headed by qualified persons. So these results come through every quarter, we analyze them in this regard and where we see that there are problems we move in ourselves and conduct these tests so that we prove what we are getting from them. We do not have the capacity as the Regulator, because they have their own equipment as well, we can also hire like the University of Zambia and any other. So if this water company does have the laboratory of its own, it can still outsource any reputable laboratory to do the tests for them but those have to come to us in a particular prescribed format, you cannot just submit anyhow in any format. So in terms of what is the basic drinking water standard in Zambia, I can tell you that we have the standards and these standards are enforced by the Regulator and are reported to the Regulator on a quarterly basis; analyzed and feedback is given. Of course if there is certain variations or maybe none compliance we give them an ultimatum within which to collect that anomaly failure to which may tell them to shut down or halt the supply and that and that… If that is clear maybe we can go to the next question.

How do you describe as adequacy in terms of drinking water? Is it 5 litre, 10 litres or 20 litres? Is there something like that in Zambia where you have a given prescribed quantity per capita per day?

Ok, ok, that is very important. Quality is one thing but also quantity is another because you can give good quality to the people but if it is not sufficient then cannot meet their basic needs. So what we have done is that, in Zambia we got a standard by Zambia Bureau of Standards but that standard talks about the demand figures when you are doing construction but now the actual consumption we have adopted what WHO have adopted. WHO has adopted three categories: Category 1 is 50 litres per person or per capita; they have also adopted the second, this is 75 litres per capita and the last one is 100 litres per capita. So in terms of these categories, they have said 50 litres per capita is bare minimum requirement but have so many risks - water may not be purely sufficient; 75 litres per capita has less risks but the recommended one is 100 litres per capita. But for now, what we have put at is 50 litres per capita. At least with 50 litres per capita we are comfortable but we still emphasize that if you can go up to 100 litres per capita the better. It may not be so much the case in our Zambian peri-urban areas, they may receive less than 50 litres per day but we insist that, because we have seen that for them they have to come up front with cash, if somebody does not have enough money then it becomes a problem but we would want everyone to have at least 50 litres. So the water companies we have told them that at least people should get that but it is up to them to buy from the kiosk. But 50 litres is the barest minimum.

What are the roles of the Kiosk operators? From your understanding as the Regulator, what are their roles?

When you say the kiosk operators, I do not know if you are talking about the vendors? ...Because the one who is operating the kiosk is Lusaka Water but those people who are vendors are selling within the kiosks. The role of the vendors is definitely to sell water, that is their basically role and mostly if not all are they paid on commission basis, ranging from 30-40%. So, for whatever water is sold they get that percent. But of course to make sure that they are not also bored, sometimes there may not be people to buy water and whatever, they are made is such a way that they are also like some shop to sell their own other things. People go to buy water they also buy other things - small, small things, groceries, and all other stuff. But the main purpose for them to be there is to sell the water, the water which is metered and of course they also have to make sure that they control - because when people go to get water they may even start cleaning the containers and whatever, they just have to control whatever is happening - but the main core is certainly to sell water and at the end of the day get their commission.

You mentioned about the provision of the shelves in the water kiosks. Yesterday, I was in the field and what I found was there were no merchandises in the kiosks and when I tried to find out why that is so, I was told that we are being told that we have to look for their own capital to invest in the purchase of the merchandise, so I do not know if you have rules or regulations, or if you have anything that you have instructed the CUs in terms of making sure that the kiosks are stocked with the merchandises?

That is also a very good question. One thing is that, that has just been a suggestion to all the water companies that let there be shelves so that the people who are selling the water themselves may want to buy certain groceries that they want to sell to the people. So, it is up to the vendors themselves to do that. But if there is a problem with capital, it is not something we can intervene and say can you provide capital but they can still negotiate with the owner of the kiosks to say ok maybe for this period maybe let me not get this commission, give me so much for the capital and then for this period maybe let me not get my commission. They can get that if they can go into that arrangement with their superior. It is just up to them to make such arrangements.

So, how is the water supplied to the water kiosks?

The water which is supplied to the water kiosks comes from the main distribution. So, in terms of fitness whatever water that we drink that is the same water that goes to the peri-urban area. So they just get a line. It is supplied from the main system. Unless otherwise it is too far and whatever then they can drill a borehole where they will supply but if it is within the locality, it is just the main system. That is why the DTF apart from general fund that they give, they also give what they call as performance enhancement funds. They give money so that it could

help them have muscle to extent services to the poor urban areas. So they may also fund certain activities but these activities should help like may be metering for instance where metering is to converse water and you have more water and then you can take service to the peri-urban areas. So even in terms of funding you find that DTF have got the general fund and the performance enhancement fund. So in short what I can say is that the water comes from the main water supply.

How much rent is paid by the water kiosks for operating the water kiosks?

There is no rent that is paid.

What other services do they pay for, the operators?

There is literally nothing they pay for.

What type of understanding exists between the operators and the owners of the water kiosks?

They sign contracts to operate as vendors. These vendors are picked from within the community. The Ward Development Committees propose people to be employed and these eventually sign contracts. The Water Trust also has similar arrangements. However, they first sign MoU with Lusaka Water and then they have mandate to employ their own vendors which also sign a contract with them.

Just a follow up on the display of the price, kiosks in Kanyama have not displayed the price. Is there a reason why this is so?

Actually may be it is because of the change of the price that is why they have not done that yet. We just recently gave them the serviceable guarantees. When you give them the serviceable guarantee they have to do for everyone including the peri-urban area. May be they have just not concluded. Others you will even find a paper, a serviceable guarantee displayed instead of the price… Will follow it up to find out why there has been this delay in displaying the approved tariffs.

What design and construction issues do the water kiosks have?

We have got a guideline. We have standards - there standard design on how a water kiosks should be constructed. This guideline has been issued to all water companies. People do not just construct water kiosks anyhow, they have got a standard. There is a standard that has been issued by the DTF that all the water companies follow.

Are there any other solutions for the supply of water to the peri-urban areas?

The only solutions are those two. You see in Zambia, the supply of water is not like other countries where it is not so much regulated. There are no other solutions like door to door vending using containers, etc unlike what is obtaining in other countries such as Kenya, Mozambique. We are more organized than other countries and a kiosk system is a more organized way of selling water but I think with time as people develop, they have more money they will definitely demand that they have their own household piped water connection. Some have demanded and they have already been connected but others are yet and it is just a matter of time but I do not know when exactly.

Thank you very much Mr. Mutale for the opportunity to share your knowledge with me, I have appreciated very much.