



UNIVERSITY OF ZIMBABWE

FACULTY OF ENGINEERING

DEPARTMENT OF CIVIL ENGINEERING



**ASSESSMENT OF PERFORMANCE OF URBAN WATER
SUPPLY IN THE CITY OF BULAWAYO, ZIMBABWE**

Belindah Ncube

M.SC. THESIS IN IWRM

JULY 2011

UNIVERSITY OF ZIMBABWE

FACULTY OF ENGINEERING

DEPARTMENT OF CIVIL ENGINEERING



In collaboration with



ASSESSMENT OF PERFORMANCE OF URBAN WATER SUPPLY IN THE CITY OF BULAWAYO, ZIMBABWE

by

Belindah Ncube

Supervisor

Prof. Dr. Eng. Innocent Nhapi

**A thesis submitted in partial fulfilment of the requirements for the degree of Master of
Science in Integrated Water Resources Management of the University of Zimbabwe**

July 2011

DECLARATION

I, **Belindah Ncube**, declare that this research report is my own work. It is being submitted for the degree of Master of Science in Integrated Water Resources Management (IWRM) at the University of Zimbabwe. It has not been submitted before for examination of any degree in any other University.

Date: _____

Signature: _____

The findings, interpretations and conclusions expressed in this study do neither reflect the views of the University of Zimbabwe, Department of Civil Engineering nor of the individual members of the MSc Examination Committee, nor of their respective employers.

TABLE OF CONTENTS

DECLARATION	iii
TABLE OF CONTENTS.....	v
LIST OF TABLES.....	vii
LIST OF FIGURES	viii
DEDICATION	x
ACKNOWLEDGEMENTS.....	xi
ABSTRACT	xii
1. INTRODUCTION	1
1.1 Background.....	1
1.2 Problem statement.....	2
1.3 Objectives of the study	3
1.3.1 Main objective	3
1.3.2 Specific objectives	3
1.4 Scope and limitations of the study	3
1.5 Justification.....	5
1.6 Report outline	5
2. LITERATURE REVIEW.....	7
2.1 Background.....	7
2.2 Performance measurement in Public Utilities.....	10
2.3 Public perception	13
2.4 Conceptual framework	15
2.4.1 Efficiency of investment	15
2.4.2 Efficiency of operations and maintenance	16
2.4.3 Financial sustainability.....	16
2.4.4 Responsiveness to customers	17
3. MATERIALS AND METHODS.....	20
3.1 Description of the study area	20
3.2 Research design	24
3.3 Data collection methods	29
3.4 Data analysis and presentation.....	31
3.5 Ethical considerations	31
4. RESULTS AND DISCUSSION.....	32
4.1 Determination of operational performance indicators for BCC.....	32
4.1.1 Efficiency of investment	32
4.1.2 Efficiency of operations and maintenance	38

4.1.3 Conclusion	39
4.2 Determination of financial performance indicators for BCC	40
4.2.1 Financial sustainability.....	40
4.2.2 Overall efficiency indicator	46
4.2.3 Conclusion	48
4.3 Assessment of public perception on performance of BCC.....	49
4.3.1 Responsiveness to customers	49
4.3.2 Conclusion	57
4.4 Summary	58
5. CONCLUSIONS AND RECOMMENDATIONS	60
REFERENCES	62
Appendices	66
A1. Key Informant Interview Guideline	67
A2. Household Questionnaire Guideline	69
A3. Research Agreement	73

LIST OF TABLES

<i>Table 2. 1: Performance Indicators used in the study.....</i>	<i>18</i>
<i>Table 3. 1: Supply capacities for Bulawayo's surface water sources</i>	<i>21</i>
<i>Table 3. 2: Bulawayo Storage Reservoirs.....</i>	<i>23</i>
<i>Table 3. 3: Characteristics of urban residential areas in Bulawayo</i>	<i>24</i>
<i>Table 3. 4: Key informant interview generation guideline</i>	<i>26</i>
<i>Table 3. 5: Household questionnaire generation guideline.....</i>	<i>27</i>
<i>Table 3. 6: Sampled residential areas for household survey</i>	<i>27</i>
<i>Table 3. 7: Survey sampling size for different residential areas</i>	<i>29</i>
<i>Table 4. 1: BCC estimated water consumption levels</i>	<i>32</i>
<i>Table 4. 2: Efficiency of investment performance indicators</i>	<i>34</i>
<i>Table 4. 3: Household consumption figures for different socio-economic groups.....</i>	<i>36</i>
<i>Table 4. 4: Efficiency of operations and maintenance.....</i>	<i>38</i>
<i>Table 4. 5: Efficiency of operations and maintenance indicators.....</i>	<i>39</i>
<i>Table 4. 6: Conceptual framework results on objective 1 for 2010</i>	<i>40</i>
<i>Table 4. 7: Conceptual framework results on objective 2 for 2010</i>	<i>49</i>
<i>Table 4. 8: Burst pipes and new connections that were reported and attended to.....</i>	<i>54</i>
<i>Table 4. 9: Conceptual framework results on objective 3 for 2010</i>	<i>58</i>
<i>Table 4. 10: Benchmark performance indicators for the study</i>	<i>59</i>

LIST OF FIGURES

<i>Figure 3. 1: Water supply dams for the study area (Adapted from Byo Master Plan 2000-2015)</i>	<i>20</i>
<i>Figure 3. 2: General elevation of the study area (Adapted from Byo Master Plan 2000-2015)</i>	<i>22</i>
<i>Figure 3. 3: General organisation chart for BCC (Adapted from Byo Master Plan 2000-2015).....</i>	<i>26</i>
<i>Figure 3. 4: Map of Bulawayo, Zimbabwe showing household survey study area (Adapted from Byo Master Plan 2000-2015)</i>	<i>28</i>
<i>Figure 4. 1: Household survey results on consumers' average household water consumption, April 2011 ..</i>	<i>34</i>
<i>Figure 4. 2: Household survey results on consumers' average household size, April 2011</i>	<i>35</i>
<i>Figure 4. 3: Costing of water by BCC for the years 2000 to 2006</i>	<i>41</i>
<i>Figure 4. 4: BCC operating cost coverage ratio performance from years 2000 to 2005</i>	<i>43</i>
<i>Figure 4. 5: Average collection period for consumers with BCC during the year 2000 to 2006.....</i>	<i>44</i>
<i>Figure 4. 6: Relationship between collection ratio and unaccounted for water for BCC for the years 2000 to 2006.....</i>	<i>45</i>
<i>Figure 4. 7: Overall efficiency indicator of urban water supply utilities for selected Southern African countries (Adapted from Water Operators Partnership-Africa Utility Performance Assessment, 2010).....</i>	<i>47</i>
<i>Figure 4. 8: Household survey results on consumers' average household income ranges, April 2011</i>	<i>50</i>
<i>Figure 4. 9: Household survey results on consumers' perceptions on cost of water provided by BCC, April 2011.....</i>	<i>52</i>
<i>Figure 4. 10: Household survey results on nature of consumers' complaints to BCC, April 2011</i>	<i>53</i>
<i>Figure 4. 11: Household survey results on consumers' perception on performance of water services provided by BCC, April 2011</i>	<i>55</i>
<i>Figure 4. 12: Household survey results on consumers' perceptions on drinking water quality provided by BCC, April 2011.....</i>	<i>56</i>
<i>Figure 4. 13: Household survey results on consumers' perceptions on pressure of piped water provided by BCC, April 2011.....</i>	<i>57</i>

LIST OF SYMBOLS AND ABBREVIATIONS

BCC	Bulawayo City Council
BWB	Blantyre Water Board
BWCP	Bulawayo Water Conservation Project
CWA	Central Water Authority (Mauritius)
IWRM	Integrated Water Resources Management
KWSC	Kafubu Water and Sewerage Company Limited
LWB	Lilongwe Water Board
LWSC	Lusaka Water and Sewerage Company Limited
MDGs	Millennium Development Goals
MoHCW	Ministry of Health and Child Welfare
NRWB	Malawi Northern Region Water Board
NWSC	National Water and Sewerage Corporation (Uganda)
OandM	Operation and Maintenance
OCCR	Operating Cost Coverage Ratio
SADC	Southern African Development Programme
SWSC	Swaziland Water Services Corporation
UfW	Unaccounted for Water
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
WDM	Water Demand Management
WHO	World Health Organisation
WSS	Water Supply and Sanitation
ZINWA	Zimbabwe National Water Authority

DEDICATION

This piece of work is especially dedicated to my mother who has stood by me and always believed in me. You are the best.

ACKNOWLEDGEMENTS

I would like to acknowledge the guidance of the Lord God Almighty in my life. I am what He says I am and I can do what He says I can do. My sincere gratitude goes to WaterNet for sponsoring the IWRM Masters Degree programme and all Civil Engineering staff in the Faculty of Engineering. To my supervisor, Prof. I. Nhapi, you have been a great mentor and pillar of strength during my time of study. Special thanks goes to the following: Mr Dabengwa and Mr Nkiwane from the City Treasurer's Department at Bulawayo City Council for your assistance in processing and interpreting financial data, Mr. K. Kujinga from the Institute of Environmental Studies, UZ and Mr Paradza from the Department of Psychology, UZ for your assistance in processing and interpreting social science data and all your constructive comments. Much appreciation goes to Bulawayo City Council staff for allowing me to carry out investigations for the study and all residents who participated in the customer survey exercise.

ABSTRACT

The provision of adequate and reliable water supply in developing countries is becoming a challenge for most water utilities especially public service providers. The existence of an information gap regarding the assessment of utility performance and a lack of focus on consumer's perceptions regarding the efficiency of service provision formed the basis of this study. The aim was to investigate performance indicators that would best reflect the efficiency of the Bulawayo City Council and to assess the perceptions from the end users. A conceptual framework was developed with 16 indicators in relation to key performance indicators broadly categorized as (a) efficiency of investment, (b) efficiency of operations and maintenance, (c) financial sustainability and (d) responsiveness to customers.

The methodology included literature and documentary review and participatory methods such as customer survey questionnaire and key informant interviews. The relative performance of the utility was analyzed based on the Overall Efficiency Indicator (OEI) which is a function of unaccounted for water (UfW) and collection ratio. Customer survey questionnaires were analysed using the Statistical Package for Social Sciences (SPSS) while the thematic approach was used to analyse data from the key informant interviews.

The research analysis revealed that Bulawayo City Council's best recorded performance was achieved in the year 2002 with an Overall Efficiency Indicator of 38% which is still far below the target of 66% according to the Water Operators Partnership-Africa Utility performance targets. Of the 16 indicators investigated only the metering level ranging from 80 % to 90 % was meeting best practise. Among other indicators were UfW ranging from 30 % to 55 %, collection ratio ranging from 35 % to 40 %, overstaffing with a range of 8 to 16 staff per 1,000 connections and cost of water at an average US\$0.72 with about 35 % consumer judgement as affordable. However, the system had a number of factors affecting its performance which include seasonal water shortages, customer affordability, declining economic situation during the years 2000 to 2006 and scarce water resources.

It was concluded that the system performance is below expectations of best practice targets and about 60% of consumers in Bulawayo generally have a negative perception of service delivery. The most cited problems arising from the perceived lack of response to burst water pipes, the lack of forewarning and explanation for water cuts and the perceived high current cost of water. It was recommended that performance targets can be achieved by strengthening the focus on consumers, providing incentives for utility managers to lift performance and through establishment of a regulatory board to monitor performance of utilities and protect consumer interests.

Key words: Best Practices, Bulawayo City Council, Performance Indicators, Urban Water Supply, Service Efficiency.

1. INTRODUCTION

1.1 Background

The cost of failing to properly address the water and sanitation gap is significantly higher than the cost of addressing it (Muhairwe, 2010). The challenge of inadequate service provision is exacerbated by the fact that population growth and the mounting pressures of increasing urbanisation have offset much of the gains in service coverage (Gentry *et al.* 1997). This constraint can be seen clearly in the context of the MDGs where Africa lags far behind other regions in expanding access to appropriate levels of services to their growing urban populations (WHO-UNICEF, 2010; Castro and Mugabi, 2009).

At the end of the last decade, Zimbabwe was well placed to meet a major strand of the Millennium Development Goal 7 (halving the proportion of people without sustainable access to "safe" drinking water and "basic" sanitation by 2015, relative to 2000 levels) with regard to water supply and sanitation coverage which was around 90% in urban areas (BCC, 2002; UNICEF AUS-AID, 2009). It has been estimated that coverage with adequate water supply is now only 60% and for sanitation only 40% (MoHCW, 2009). The quality of water provided and the high standard of sanitation service that Zimbabwe's urban areas enjoyed in the past has deteriorated significantly implying that access, quantity and quality has declined and thus is not increasing, counter to the MDGs to which Zimbabwe signed up (WHO-UNICEF, 2010).

Apart from problems of service coverage, other problems also plague public service providers. Many public utilities, for example, experience high Unaccounted-for-Water (UfW) rates, which often range between 40%-60%. Such UfW rates mean that half of the potable water produced by a service provider is lost somewhere in the provision process. Public water utilities are also frequently overstaffed. According to Haarmeyer and Mody (1997) these utilities have five to seven times more employees than what is considered 'efficient'. Moreover, the service providers are often challenged with financial problems due to a combination of low tariffs, poor

consumer records and inefficient billing and collection practices (Idelovitch and Ringskog, 1995; Mwanza, 2004).

Based on the nature of water services and the factors underlying the organization of the water services sector, each region has organized the water services sector in their own way, resulting in a wide landscape of organizational modes. Although the specific characteristics of each region differ, in the vast majority of cases the responsibility for providing water services has been attributed to the public sector organizations. Although exact figures on the degree of private sector participation in the water supply and sanitation sector do not exist, it is generally assumed that the number of people served by private utilities is limited to about 200 million (OECD, 2003). This leaves about 5.8 billion people who receive water services from either public water utilities or independent systems. It appears that many developing countries emphasize the fact that water services are a merit good in combination with the sector's monopolistic characteristics. This underscores the need for strong regulatory arrangements to protect the consumers of water services. For this purpose many countries have opted to have the task of water service provision undertaken by public sector organizations (Hughes, 2003).

The efficient performance of water utilities is a key issue in urban water supply in the Zimbabwean governments' quest for improved service delivery (WHO-UNICEF, 2010). The existence of information gap and little studies on the performance of Public Water Supply Utilities in Zimbabwe formed the study. This research seeks to use existing theories/tools to assess technical-operational performance, financial performance and to assess the public perception on the performance of water services provision. Bulawayo City Council was used as a case study to carry out investigations on the performance of the water utility and the consumer's perceptions regarding its performance.

1.2 Problem statement

The City of Bulawayo in Zimbabwe is located in Natural Region 4 of Zimbabwe (Encyclopaedia Britannica, 2010) characterized by annual rainfall of between 400 and 650 mm. This reflects a drought-prone area with low rainfall amounts. Frequent

water restrictions and rationing are common in Bulawayo and this has been necessitated by scarce water resources due to insufficient storage in the supply dams coupled by the high evaporation rates and siltation (BWCP, 2001; BCC, 2002). Bulawayo is the second largest city in Zimbabwe with a population of about 677,000 (CSO, 2002). The heavy industry consumes about 30% of the restricted demand of 120,000 m³/d (BCC, 2004). Faced with the challenges of meeting demand and the general economic decline in the recent past which contributed to poor service delivery, there is need to establish how BCC has been performing. The perception of residents regarding the performance of service delivery by BCC needs to be established as there is no regulator to protect the interests of consumers.

1.3 Objectives of the study

1.3.1 Main objective

The main objective of the study was to assess technical and financial performance of BCC and how this performance is viewed by the consumers.

1.3.2 Specific objectives

1. To determine technical-operational performance indicators of BCC
2. To determine financial performance indicators of BCC
3. To assess public perception on performance of BCC

1.4 Scope and limitations of the study

Although there are several indicators that are used for the assessment of the performance of urban water supply services provision (Tynan and Kingdom, 2002; Mwanza, 2006; Yguinez, 2009), the relative performance of BCC was based on comparing the total volume of water the utility produces and the total volume of water for which the utility collects revenue. This will provide an approximate indication of the overall position of a utility which will assist to make an overall conclusion on performance of the utility (Mwanza, 2004; Baietti *et al.*, 2006; Castro and Mugabi, 2009). Information contained in this study is limited to urban water supply only.

In other similar studies quoted in Msuku *et al.* (2010) where they carried out financial performance assessments in Malawi's public water supply utilities, UfW was included as a major indicator though not a financial performance indicator. The UfW has indirect impact on the revenue as the cost of production of the water becomes heavy on the utility. The costs associated with UfW are pumping costs, treatment costs, transmission costs and storage costs, among others. It is in line with these associated costs and the technical factors that account to UfW that it was deemed imperative to assess technical and financial performance indicators as the UfW is also a major link between these two performance categories.

Kimey *et al.* (2008) studied two main indicators in Tanzania's urban water supply utilities which are quality of service and UfW. In their findings, performance of the utilities was measured by levels of UfW and service quality was measured by consumer's perceptions regarding the water quality, billing efficiency and customer care, which affect consumer's willingness to pay. Water demand management strategies were recommended for the reduction of UfW and environmental conservation awareness campaigns for the end users.

Chinyama *et al.* (2007) in their studies assessed the impact of effective metering and billing on water demand management in the city of Bulawayo, Zimbabwe. Among some of her findings was how UfW could be used as a crude measure of Water Demand management performance of a water utility as metering and billing practises influence the levels of water consumption by different consumers. The study was limited to one component of UfW to assess the performance of BCC utility.

The researcher inclusively considered performance indicators from Kimey *et al.* (2008) and Msuku *et al.* (2010) to assess the performance of Bulawayo City Council as a water service provider and how it can best improve its water supply services.

The following limitations were encountered during the study:

- Legal implications to accessing data from BCC - Prior to the collection of data an application was made to each department to seek permission to access information for the study. All applications were forwarded to Council (board of directors including the town clerk and mayor) for review. The review process

took 2 months before legal binding permission was granted to proceed with the study on the 1st of February 2011. (see Appendix 3)

- Inflation and accounting for unaudited data - accessibility was granted only to audited information with the exception of the year 2010 which corresponded to the household survey results. The latest years with relevant audited information to the study were 2000 to 2006.
- Comparison of data with different currencies (ZWD\$/USD\$) - the years 2000 to 2006 reflect values in ZWD\$ while 2010 is in USD\$. Processing and analysis of data was made without any conversion of currencies since ratios were used for financial indicators.
- Challenge of an academic study on a realistic institution - the data collection was mostly from the Engineering Services and Financial Services departments. Some key informants were not at liberty to release information for the study.

1.5 Justification

In Zimbabwe reforms have taken place in the water sector to address irregularities that existed in water resources management which affected coverage and equity in water supply and sanitation distribution around the country. Among some of the reforms which include access to water for primary use for all, all water to be beneficially used, water to be treated as an economic good and water tariffs to take cognizance of those unable to pay the full price. Constraints to sustainability aggravated by the macro-economic challenges faced by Zimbabwe during the period 2006-2008 eroded capacity of local authorities to operate efficiently.

Among some of the water problems associated with service delivery in Zimbabwe which include insufficient coverage of services, interruption of services, low water quality for human consumption, water losses and financial problems. Little has been done to review and analyze the performance of the urban water supply utilities.

1.6 Report outline

Chapter 1 -Introduction, research questions, objectives of the study, scope of the study on what other scholars have done with an indication of which main category of

indicators were selected for the study and the limitations encountered in accessing information for these indicators.

Chapter 2 -Theoretical part of the thesis with brief background on WSS situation globally and nationally. Literature review on what other authors have suggested relating to performance measurement in public utilities and public perceptions on water services provided by public utilities. A conceptual framework was developed with the indicators that would be used for the study.

Chapter 3 – The chapter gives the description and background of the City of Bulawayo, the capacity of the water supply utility BCC and how it functions. Information about residential areas selected for the household surveys. Description of how the research was carried out, what data was collected and how it was processed including relevant data collection techniques that were used. The chapter indicates what actually happened in the field.

Chapter 4 - This chapter looks at the raw data that was collected in line with the conceptual framework developed. All data collected during the face to face interviews, the analysis and discussion of the results. The data was organised scientifically using tables and graphs to make interpretations.

Chapter 5- The chapter gives conclusion and recommendations derived from findings in chapter 4 while also outlining areas for future research. The researcher also narrates main observations made during the research.

2. LITERATURE REVIEW

2.1 Background

The provision of safe and clean water to rural and urban communities ranks top among the priorities of governments all over the world (HDR, 2006). During the International Conference on Water and the Environment in 1992 in Dublin another description was added to water in which water was to be ‘recognized’ as an ‘economic good’, which highlighted that water had an economic value in all its competing uses (IWCE, 1992). Although the exact meaning of the term ‘economic good’ is rather vague, it has arguably been the most contested and debated of the Dublin principles. Moreover, it sharply focused discussion of water services provision to questions relating to the financing of the service provision process. According to some identifying water services as an economic good allowed for new economic instruments to be explored that could be used to realize service provision improvements. Others, however, argued that the emphasis on water as an economic good was nothing short of moving towards the ‘co modification’ of water. In this perspective categorizing water as an economic good was a first step in ‘privatizing’ the provision of water services. Each of the categorizations mentioned above are correct, in the sense that water services can indeed be viewed as a private good, and they are indeed an economic good (in the sense that water is a scarce resource), and they are indeed a merit good and they are indeed subject to market failure. What makes managing water services difficult, however, is that these different perspectives can lead the water manager to different ways of managing water services. The main question is which of the different dimensions are emphasized by the respective manager.

An illustration of the dimensions regarding the management of water services is the comparison of two contrasting statements. Nickson and Franceys (2003) argue that the nature of the water services sector is such that it “*does not provide any argument in favour of direct public provision*”. Barlow (2002), on the other hand, takes a different perspective. She emphasizes that “*water is part of the earth's heritage and must be preserved in the public domain for all time and protected by strong local,*

national and international law”. She continues by saying that “*we believe that access to clean water for basic needs is a fundamental human right. Each generation must ensure that the abundance and quality of water is not diminished as a result of its activities.*”

What distinguishes the two statements, however, is the emphasis they place on the different aspects of the nature of water services. If an emphasis is placed on water services as a private and economic good, whilst still acknowledging that it is also merit good subject to market failure, the statement made by Nickson and Franceys (2003) can be understood. Essentially, a private, economic good could be provided by the private sector as long as adequate regulation is in place. The role of the government could then be limited to that of regulation, whilst provision could be left to the private sector. Barlow (2002), on the other hand, emphasizes the ‘merit good’ nature of water services. If this aspect is emphasized, the private sector becomes a lot less attractive as a service provider. In case of a merit good, a private utility may have the incentive to undersupply the merit good or to try to limit or avoid supplying the good in unprofitable locations. If one prioritizes the water services as a merit good then Barlow’s perspective that the provision of water services should be kept in the public domain seems logical. In other words, emphasizing different characteristics of the nature of water services will likely lead to different management options.

The dimension in which the organisation of the service provision process may vary from one location to next relates to the type of organisation that is responsible for providing water services. This dimension relates to the characteristics of the service provider (public, semi-public or private organisation, legal status of the organisation) and the administrative level (local, regional, national) at which the organisation operates. The importance of this dimension lies in the fact that different types of organisations may have different rights and obligations, which may benefit or hamper service provision (Schwartz, 1999). Vickers and Yarrow (1991) and Martin and Parker (1997) found that on balance it seems that neither private nor public sector production is inherently or necessarily more efficient.

Public utilities provide the “cheapest” water and because of economies of scale once the network is in place, the marginal cost of delivering each additional unit of water decreases sharply, (Kariuki and Schwartz, 2005). Most governments regulate tariffs to achieve a range of equity and efficiency objectives (Schwartz, 2006). The tariffs are designed to provide water that is affordable to households and to generate enough revenues to cover part or all of the costs of delivery. The problem in many cases is that tariff structures intended to enhance equity have the opposite effect, (UNDP, 2006). Water provision through a network is a natural monopoly hence this reduces the scope for efficiency gains through competition and makes effective regulation to secure consumer interests an imperative, (UNDP, 2006). The key role of regulation in this context is to create competitive pressures, set prices and quality standards, establish targets for investment and maintenance and ensure that the benefits of efficiency gains are passed on to consumers (Mwanza, 2004; Castro and Mugabi ,2009; Muhairwe ,2010).

Zimbabwean municipalities fall into the category of public utilities whose jurisdiction is governed by various policies which include the amended Zimbabwean Urban Councils Act of 2002 and the constitution of Zimbabwe. The Bulawayo City Council has the mandate to supply water to households and industries in the city under section 168 of the Urban Council’s Act (Chapter 29:15) and section 64 of the Public Health Act (Chapter 15: 09), the city is also recognised as the water and sewerage authority for the area under its jurisdiction (Zimbabwe, 1996a and Zimbabwe, 1996b). The act provides for urban local authorities to enter into partnership to outsource the provision of these services. As far as participatory governance structures, it was observed that Bulawayo has ratepayers associations that are represented from ward level (Mkandla *et al.*, 2005). These act as pressure groups and are mandated to advocate for improved municipal service delivery and were originally formed to co-ordinate and assist citizens in representing their interests to the elected Council of Bulawayo.

Historically in Zimbabwe most urban councils have been well-run, responsive and have provided all municipal services including utilities of water supply, sewage collection and disposal to a good standard. With the political and economic crisis in the years 2005 to 2009 coupled with hyper-inflation and burgeoning poverty, costs

increased and the ability to pay them decreased (WHO-UNICEF, 2010). Urban services like many other services suffered. In 2005 in an effort to address the situation central government gave responsibility for town water supplied to the national agency, the Zimbabwe National Water Authority (ZINWA). There was little changed as ZINWA suffered from the same problems as the urban councils, which among them included a lack of finance and expertise aggravated by the exodus of ‘brain drain’ migration out of the country in search of greener pastures (Manzungu, 2006; UNICEF-AusAID, 2009).

In February 2009, water and sanitation services taken from urban councils and given to ZINWA were handed back to local authorities to operate and maintain. This initiative had a further unfortunate outcome as some Council observe that many of the records of operations were negatively affected during 2006 to 2009 which were coupled with overlapping responsibilities during the time of take-over by ZINWA. As a result little information exists on the operations of the utility during the respective period (UNICEF-AusAID, 2009; BCC Report, undated).

2.2 Performance measurement in Public Utilities

The concept of performance indicators of water utilities is a guide to show how well a utility is doing in meeting their goals and objectives. Indicators are pointers, numbers, facts, opinions or perceptions that measure an organizations performance (Wouter *et al.*, 2005). Any Municipality’s performance, hence its ability to coerce customers to pay for services rendered, requires some sort of accountability. Baietti *et al.* (2006) points out some of the key performance indicators that should exist in any municipality. Their argument points to;

- a) External accountability as referring to customer orientation thus includes the extent to which utilities “listen” to clients, how it works better to meet their needs, solicit their views regarding standards and levels of services and how to answer promptly to their complaints.
- b) Internal accountability looks at how management and staff are held accountable for effectiveness and efficiency. The indicators would include staff annual performance evaluation, rewards and penalties to staff for inducing performance and training of staff.

Municipality performance targets suggested by Baietti *et al.* (2006) for developing nations –

- Total revenue
- Water production
- Drinking water quality
- Customer service
- Water consumption
- New connections.

On the other hand Yniguez (2009) suggests the following performance targets for water utilities in Asian developing countries;

- Coverage percentage
- Availability of service offered in hours per day.
- Consumption in litres per capita demand
- Metering percentage
- Operating ratio
- Collection period
- Staff to 1000 connections

The public policy for the private sector in setting performance targets for water utilities by Tynan and Kingdom (2002) suggest the following standards for developing countries:

- UfW
- Working Ratio
- Collection Period
- Water Supply Connection fees
- Affordability of water
- Continuity of service

However Tynan and Kingdom (2002) argue that their suggested proposed targets are not comprehensive but there is need to provide a complete assessment of utility performance by expanding the measures to governance and accountability, to capital efficiency and to better measures of responsiveness to the needs of the poor. Tynan and Kingdom (2002) argue that performance indicators serve three purposes:

- a) To highlight the wide variation of performance to be found amongst developed and developing country utilities. This will provide stakeholders

with some appreciation of the range of values to be found around the world, and the performance being achieved by “best practice” providers.

- b) To propose target indicator values for utilities in developing countries. These target values are already being achieved by utilities in developing countries thus giving them grounding in reality.
- c) The exercise will be a starting point from which more comprehensive and regularly updated analysis can be undertaken, providing stakeholders with more and better information with which to assess the performance of their utilities.

OfWat International Comparator studies, OfWat (2007) as cited in Schouten (2009), which were executed to set out relative performance by making international comparisons in a number of key performance areas and to assess whether privately owned companies outperform public WSS providers suggest the following main indicators;

- Bills to customers
- Customer Service levels
- Water quality and environmental performance
- Water delivered, leakage and water efficiency
- Unit costs and relative efficiency
- Network activity
- Financial performance

According to OfWat (2007), the approaches to define, collect and use performance indicator information vary dramatically between the WSS providers; therefore they recommend that interpretation be done with care.

In defining and collecting useful indicators the main question would follow, “Is performance linked to how well a Municipality is able to collect revenue, and then how can such a municipality improve its performance to enhance its revenue collection?” Baietti *et al.* (2006) argues that certain key performance indicators must be set in motion and be satisfied for any utility to be a good performer and hence this consequently or directly has a positive appeal in the face of customers. Castro and Mugabi (2009) suggest the use of an overall efficiency indicator that attempts to provide a global measure of utility efficiency by comparing the volume of water for which the utility collects revenue and the total volume of water it produces. There is

some evidence from several studies that competition is generally more important than ownership in explaining performance improvements in the WSS sector. Galal *et al.*, (1994), Sachs *et al.*, (2000), Wallsten, (2001) and Zhang *et al.*, (2003a and 2003b) all conclude that ownership alone is not enough to generate economic performance improvements in WSS sector but competitive markets also reinforce the benefits of public ownership.

Municipalities provide a service that should be generating enough revenue to meet operation and maintenance costs and at the same time be able to sustain the staff employed to run it. Revenue comes from different sources namely; government grants, bank loans, donors and from customers. The system should be self sustaining being able to rely most from finance streams flowing from the customer. This can only be achieved if the service delivery is appealing to the customer and there is openness and accountability as supported by Baietti *et al.* (2006). Municipalities in Zimbabwe provide a mix of public services such as education, land, caravan and recreational parks, botany gardens, cemeteries, stadiums, beer halls, access roads, city halls; user services (water, sanitation and hygiene, refuse), shop licenses, rentals from flea-markets (informal sector), rates, parking fees and property leases (*ibid*).

2.3 Public perception

To what extent do public utilities “listen” to clients, work to better meet their needs, solicit their views regarding standards and level of service, or answer promptly to their complaints? Important measures of customer orientation include friendliness of the customer billing and collection system, orientation toward seeking customers’ opinions and views, availability of options for service delivery, timely information to customers on developments in relation to water services, and response to customers’ complaints (Baetti *et al.*, 2006)

Price does have an effect on the amount of water demanded by all classes of water consumers, and consumer's attitudes to water usage and their perception about water consumption may be changed by appropriate water payment strategies. Khanyakahle (2006) in her investigations of effective municipal payments found that it is expected that loyal ratepayers, that became loyal because of positive experiences with the

municipality will influence others positively through what they say and do. Her findings were that most of the lower income households find their accounts difficult to understand and pay their accounts by cash. The higher income groups, it was found, made use of a variety of payment options such as cash, credit card, bank transfers, etc.

The level of willingness to pay should not be a forced down matter on clients if service delivery is satisfying, if there is constant engagement between the municipality and the customer, and if there is clear communication as highlighted by Bov'ee and Thill (1992, 2) of a motivated and capable working staff with clearly laid out key performance indicators that could be attributable to the turnaround of an organisation. In a paper by Kitundu (2005) for Mwanza city council in Tanzania, speaks on stakeholders' involvement as demonstrating the importance of partnership and how it brings out a shared vision, alliances, action goals, dialogue, mutual trust and mutual benefits. He goes on to demonstrate the positive effects of mutual understanding between the service provider and the customer resulting in improved revenue.

Nickson (2002) argues that decisions related to the provision of water services are mainly taken with the aim of achieving the objectives of the producer-side, rather than the consumer-side of the service provision process. With the objectives of the producers often conflicting with those of the consumers, while the services provided to the consumers are of a very low quality. Wolff and Gleick (2002) encourage the "soft" path for water which delivers diverse water services matched to the users' needs and works with water users at local and community scales. The soft path is a comprehensive and long term approach to water demand management which requires active participation by water users and effective strategic planning to create the appropriate mix and timing of conservation measures. The "soft" path relies on centralized infrastructure, but complements it with extensive investment in decentralized facilities, efficient technologies and human capital which provide an integrated approach to improve performance of utilities. The soft path has been witnessed by the contribution of humanitarian organisations that have complemented water service provision outside the water utilities' boundary in the form of boreholes, rainwater harvesting, bowsers and other efficient technologies. While the "hard" path

which relies almost exclusively on centralized infrastructure and decision making which has proved to negatively influence performance of utilities through the top-down management approach of service delivery.

In assessing quality of drinking water, consumers rely principally upon their senses. Microbial, chemical and physical water constituents may affect the appearance, odour or taste of water and the consumer will evaluate the quality and acceptability of the water on the basis of these criteria (WHO, 2004). Hoko and Hertle (2006) state that the perception of water quality is partly subjective, apart from personal sensitivity to taste, adaptation could account for the differences, and adaptation is affected by such factors as duration of stay in the area, period of use and availability of other sources. Gulyan (2001) found that although some substances in water may have no direct effect, water that is highly turbid, highly coloured or has an objectionable taste or odour may be regarded by consumers as unsafe and may be rejected for the use.

2.4 Conceptual framework

In this section, the topic of performance is elaborated upon by looking at a framework for analyzing performance which was developed by Tynan and Kingdom (2002). The framework forwarded by Tynan and Kingdom was originally developed as a framework for benchmarking, meaning that the framework would allow for a comparison between different utilities. The frame work distinguishes the following performance categories broadly categorized as a) efficiency of investment, b) efficiency of operations and maintenance, c) financial sustainability and d) responsiveness. The indicators they have suggested might not necessarily represent the best possible indicator for a selected dimension. This is because they also use the criterion of availability of information of the indicator for the selection of the indicator.

2.4.1 Efficiency of investment

Efficiency of investment refers to investment in new assets which Tynan and Kingdom (2002) emphasize should only occur when absolutely necessary and to ensure efficient, long-run operation of existing assets and daily maintenance.

Maintenance is crucial for pipe networks which account for up to 70% of asset value but are often neglected in favour of more visible assets. The measure of UfW, which is the difference between water supplied and water sold as a percentage of water supplied, captures both physical and commercial losses due to illegal connections and inefficient billing respectively. Thus high levels of UfW indicate poor system management, poor commercial practices as well as inadequate pipeline maintenance.

2.4.2 Efficiency of operations and maintenance

Operational efficiency is defined by Tynan and Kingdom (2002) as the lowest cost use of inputs which could be labour, energy, water and materials in the daily operation of a utility with the most efficient combination of inputs depends in part on local input prices and past capital investment decisions. Analysts use ratios of inputs to outputs to measure operational efficiency. One such ratio is staff per 1000 connections with a high ratio possibly indicating single water connections serving multiple households or may reflect inefficient use of staff.

2.4.3 Financial sustainability

Financial sustainability requires timely collection of payments and cost recovery relating to capital asset values and rates of return on investment. Failure to cover costs leads to underinvestment in assets, weakened operations and declining service quality. Therefore financial performance of an organisation is important whatever its regulatory framework (OfWat, 2007). Some key financial ratios provide an indication of a company's ability to finance its functions. A simple measure of cost recovery is the working ratio- the ratio of total annual operational expenses, excluding depreciation and debt service, to total annual pre-tax collections from billings and subsidies (Tynan and Kingdom, 2002). A working ratio of more than one means that a utility fails to recover even its operating costs from annual revenue, while a ratio of less than one means that it covers all operating costs plus some or all of its capital costs. Castro and Mugabi (2009) cite the inverse of the working ratio as the operating cost coverage ratio (OCCR) as a key measure of the utility's ability to cover its operating costs (excluding interest and depreciation) from revenues, without reliance on external subsidies.

2.4.4 Responsiveness to customers

A utility's responsiveness to its customers is usually indicated by the quality of services it provides. However, quality of service has several dimensions - water availability, water quality, water pressure, and customer relations. But the only ones for which the sample provides sufficient data is water availability as captured by the continuity of service, hours of service a day (Tynan and Kingdom, 2002) and customer relations as captured by the number of customer complaints and response time it takes to address complaints. Castro and Mugabi (2009) argue that Water Services can perform Utility Performance Assessments through tools derived from Tynan and Kingdom's (2002) Water scorecard with the objective of identifying utilities' operating strengths and weaknesses which will assist in moving towards standardizing the indicators for the sector in Africa. The report takes into consideration the fact that indicators should not be interpreted rigidly as utilities face different social, political and financial constraints but rather as indicative of strength or weaknesses of a utility relative to its peers. Schouten (2009) in his studies concluded that comparing the performances of water companies in Europe through benchmarking schemes is just as hopeless as comparing the beauty of a tulip with that of a rose, also citing benchmarking as a type thereof, by soccer trainers abominated, scoreboard journalism. OfWat Report (2007) as cited in Schouten (2009), suggest that data is very robust and can only be used to put the regulated companies' performance in an appropriate wider context suggesting that data is not fully comparable but exposes differences that challenge the current performance levels of the regulated. The report further concluded that the results of the empirical studies carried out were very mixed, some giving advantage to public ownership, others to private ownership and yet others had no significant difference between the two.

Castro and Mugabi (2009) give a list of indicators derived from Tynan and Kingdom (2002) which have been used in setting performance targets for water utilities for selected African countries. These indicators are derived from the performance of the top quartile of all utilities in the Water Operations Partnerships (WOP) - Africa Theme Report, 2009. Guided by the ideas and concept from each of the performance categories, it is possible to develop indicators that suit the local circumstances as shown in Table 2.1.

Table 2. 1: Performance Indicators used in the study

<i>Performance Indicator</i>	<i>Description</i>	<i>Range</i>	<i>Reference</i>	<i>Selected target</i>
<i>1. Efficiency of investment</i>				
a) UfW	Volume of water 'lost' as % of net water supplied.	15-23%	Tynan and Kingdom, 2002; Mwanza, 2004.	20%
b) Percentage of metered connections	No. of connections with operating meter as % of total connection	80-100%	OfWat, 2007; Yniguez, 2009	85%
c) Overall efficiency indicator, (OEI)	Ratio of total volume for which utility collects revenue and the total volume of water it produces.	>66%	Baietti, 2006; Castro and Mugabi, 2009	66%
<i>2. Efficiency of operations and maintenance</i>				
a) staff/1000 connections	Ratio of inputs to outputs	<5	OfWat, 2007; Yniguez, 2009	5
b) water production and consumption	Supply to meet demand, m ³ /dy	>100l/cap/dy	Tynan and Kingdom, 2002; OfWat, 2007.	100l/cap/dy
<i>3. Financial sustainability</i>				
a) average tariff per m ³	Actual amount billed per m ³ of water	US\$0.12 - US\$1.12	Mwanza, 2004; Castro and Mugabi, 2009; Muhairwe, 2010	US\$0.76
b) unit operating cost per m ³ sold	Ratio of utility's total annual operating expenses and total annual volume of water sold	>ave tariff per m ³	Mwanza, 2004; Castro and Mugabi, 2009; Muhairwe, 2010	>ave tariff per m ³
c) operating cost coverage ratio, (OCCR)	Ratio of total annual billed revenues to total annual operating costs (excl. interests and depreciation)	0.8-1.5	Mwanza, 2004; Castro and Mugabi, 2009; Muhairwe, 2010	1
d) collection ratio	Ratio of actual revenues collected and total billed revenues	73-100%	Mwanza, 2004; Castro and Mugabi, 2009; Muhairwe, 2010	73%
e) collection period	Average time to collect outstanding revenues	<3months	Mwanza, 2004; Castro and Mugabi, 2009; Muhairwe, 2010	3mths

4. Responsiveness to customers		<20%	Tynan and Kingdom, 2002;	<20%
a) Cost of obtaining a new connection	Percentage of average household income		Castro and Mugabi, 2009	
b) cost of water	Percentage of consumer judgement as affordable	>75%	Tynan and Kingdom, 2002;	>75%
c)water availability	Hours of service per day	24hrs	Castro and Mugabi, 2009	24hrs
d) response to consumer complaints	Average response time	<3dys	Tynan and Kingdom, 2002;	<3dys
e) Water quality and pressure	Percentage of consumer satisfaction	100%	Tynan and Kingdom, 2002;	100%
			Castro and Mugabi, 2009	

3. MATERIALS AND METHODS

3.1 Description of the study area

The study was carried out in the City of Bulawayo which is Zimbabwe's second largest city with an estimated population of over 677,000 in the year 2002 (CSO, 2002). Bulawayo is situated in the south western part of the country 1,341 metres above sea level in a semi-arid and drought-prone region with a long-term average rainfall of about 650 mm per year (Encyclopaedia Britannica, 2010). The city is situated near the divide of the northern catchment area draining to Zambezi River and the southern catchment area draining to Limpopo River. Its location near the water divide has significantly contributed to its water problems as all rivers within easy reach are small with small catchment areas (Chinyama *et al.* 2007).

Figure 3.1 shows water supply sources in Bulawayo which consist of 5 dams in the Southern Catchment (Matabeleland South), namely Umzingwane, Inyankuni, Insiza and Ncema Complex (constitutes of Upper Ncema and Lower Ncema).

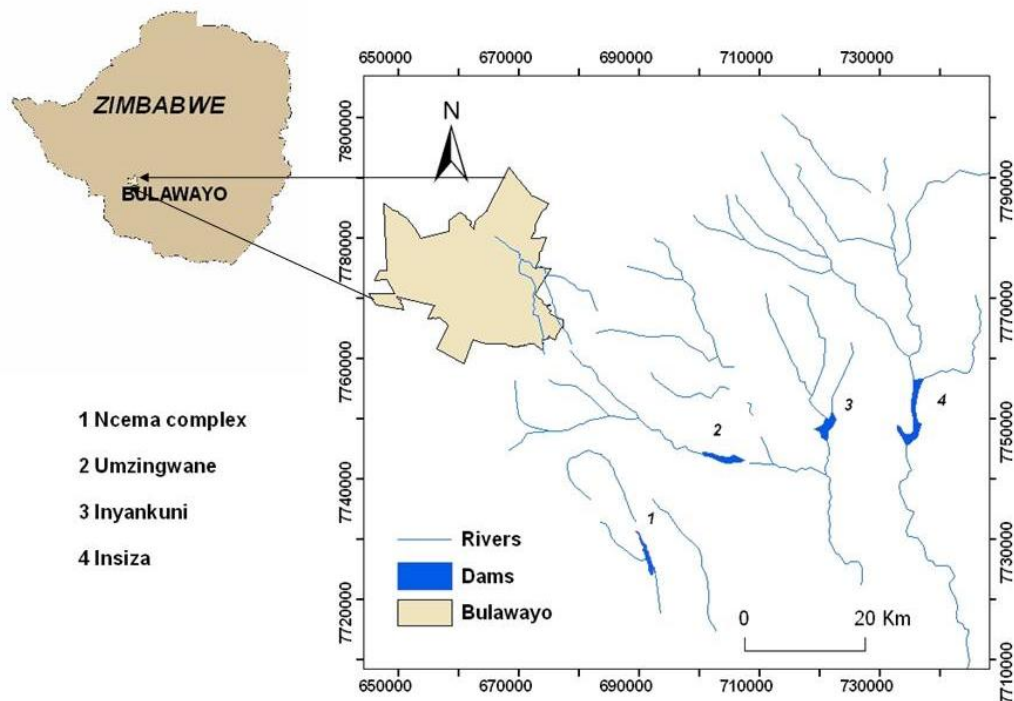


Figure 3. 1: Water supply dams for the study area (Adapted from Byo Master Plan 2000-2015)

There is also a groundwater scheme (not shown), north-west of Bulawayo with 68 boreholes commissioned in 1993 (BWCP, 2001, BCC, 2004). The present total capacity of Bulawayo's water supply dams is 352 million cubic metres (Table 3.1). The operation policy for the urban water supplies in Zimbabwe is that the water supply dams should hold at least 21 months supply by 31 March of each year (BCC, 2000). If the quantity of water stored is less than this, then water rationing must be introduced.

Various engineers have calculated the 4% yield of Bulawayo's Southern Catchment dams over the last few years and related it to the risks of water scarcity which could pose a threat to future water supplies (Table 3.1). Some alternative sources of water for the city have been sought through the Bulawayo Matabeleland Zambezi Water Project and the Mtshabezi Dam Project but funding remains a major setback in the implementation of these proposed projects (BWCP, 2001; BCC, 2004).

Table 3. 1: Supply capacities for Bulawayo's surface water sources

<i>Dam (Net Capacity-m³)</i>	<i>4% Yield (m³/d) to BCC</i>				
	<i>Department of Water Resources (Various dates)</i>	<i>Burrow Binnie (1992)</i>	<i>SWECO Feasibility Study (1995)</i>	<i>Bulawayo City Council (No date)</i>	<i>Ministry of Rural Resources and Water Dev (1999)</i>
Umzingwane (42 million)	26,197	31,233	35,342	33,151	30,040
Inyankuni (74 million) ¹	17,699	23,836	20,822	36,428	17,697
Ncema Complex (63 million)	56,986	61,644	42,466	60,00	36,095
Insiza (173 million)	48,244	75,616	33,699	45,205 (Stage 1 Only)	28,643
Total Yield	149,126	192,329	132,329	174,794	112,475

Source: (BWCP, 2001; BCC, 2004)

The existing water supply system serving the City of Bulawayo comprises of two water treatment plants namely Criterion and Ncema Water Treatment. Works have today an estimated capacity of 181,000 m³/d and 30,000 m³/d respectively, which amounts to a total of 211,000 m³/d. At the time of the interview (April, 2011) it was reported that the City's water reticulation system consists of approximately 6,000 km of various sizes of pipeline and 6 distribution reservoirs. The distribution is mainly by gravity feed. The bulk of the reticulation system is old and has never been replaced since establishment more than 40 years ago (UNICEF-AusAID, 2009; BCC, 2010). This is the perceived cause of recurrent water bursts and leaks which have resulted in serious water losses in the system estimated at between 35 to 40% (BCC, 2010). The City has well over 10,000 m of pipelines that are not functional. As a result, water consumptions for these places are currently unknown and billing was therefore based on estimates (Chinyama *et al.*, 2007).

Bulawayo's water reticulation is fed with water from 6 reservoirs which are interlinked. Treated water is fed into the reservoirs from where it gravitates into the reticulation system. Figure 3.2 shows the general elevation of the city of Bulawayo which slopes down from the south towards the north.

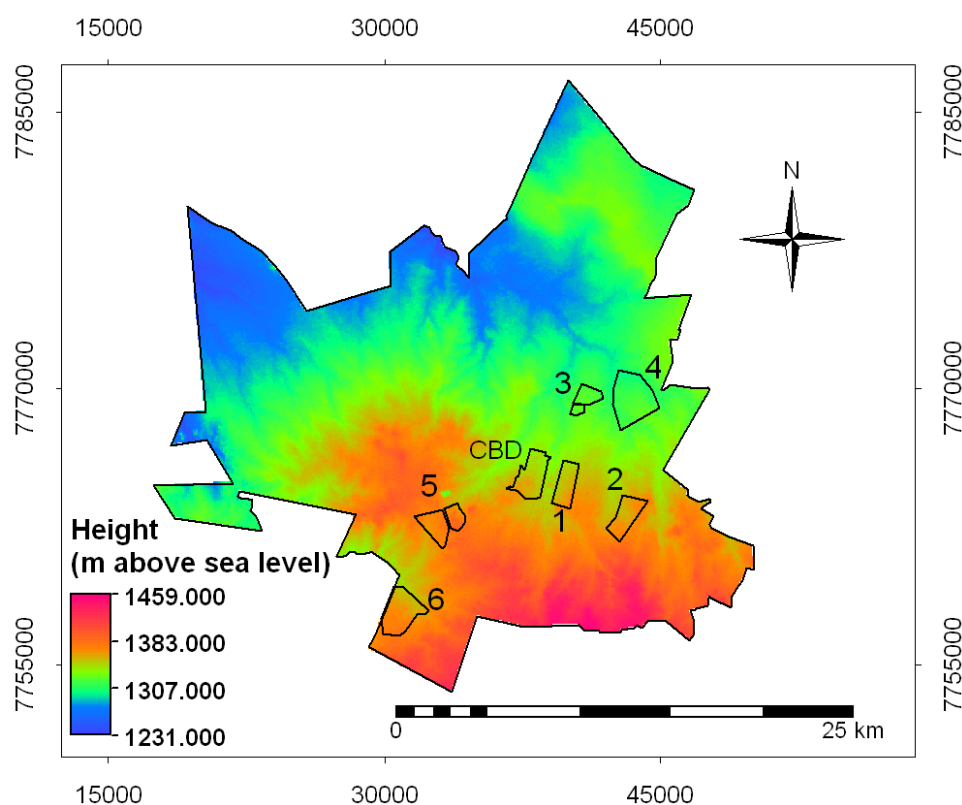


Figure 3. 2: General elevation of the study area (Adapted from Byo Master Plan 2000-2015)

The list of the reservoirs and their capacities during the years 2002, 2004 and 2006 is shown in Table 3.2. Woodville reservoirs have been abandoned over the years due to lack of capital funding for expansion. At targeted consumption of 100,000 m³/d, this represents about 4 days' storage which is safe assuming the reservoirs are full (BCC, 2010).

Table 3. 2: Bulawayo Storage Reservoirs

<i>Reservoir</i>	<i>Capacity, m³</i>		
	<i>2002</i>	<i>2006</i>	<i>2010</i>
Tuli Hill	50,000	50,000	50,000
Criterion	90,000	90,000	90,000
6J	45,000	45,000	45,000
Hillside	45,000	45,000	45,000
Rifle Range	67,500	67,500	67,500
Magwegwe No.8	108,000	108,000	108,000
Woodville	2,250	-	-
Total	407,750	405,500	405,500

Source: (BWCP, 2001; BCC, 2002, 2006 and 2010)

The Bulawayo City Council was declared a municipality in 1897 according to Zimbabwean classification of towns. BCC is composed of five departments namely housing and community services, health services, engineering services, financial services and chamber secretary. The engineering services department is further divided into roads, town planning and water services where water services constitute water supply (water supply treatment and wastewater treatment), water distribution (water supply and sewage) and electro-mechanical divisions (BCC, 2010).

The current number of customers is estimated at approximately 150,000 (ie. number of water supply connections) and the consumers targeted in the community include domestic, non-domestic, institutional and commercial. It is estimated that there are around 146,000 dwelling units (made up of 122,000 in the high density suburbs and 24,000 in the low and middle density areas respectively (all typology of dwellings) accommodating approximately 350,450 separate households. This means there is an average 2.4 households occupying every dwelling unit (deduced from the Master

Plan). However, it would appear this growth rate has increased in the years 2007 to 2009 during the unfavourable macro economic conditions where there has been a massive migration into the city evidenced by a great rise of the informal sector and overcrowding (BCC Report, 2010). The consumer survey study focused on domestic consumers and was carried out in 6 suburbs: 2 high density, 2 medium density and 2 low density suburbs (Table 3.3)

Table 3. 3: Characteristics of urban residential areas in Bulawayo

<i>Residential Area</i>	<i>*Size of Land Holding</i>	<i>Level of Income</i>
Low Density	>1,000 m ²	High Income (>US\$900)
Medium Density	400-1,000 m ²	Middle Income (between US\$180 and US\$900)
High Density	150- 400m ²	Low Income (<US\$180)

*Adapted from: Manzungu and Machiridza, (2005), *Byo Master Plan (2000-2015)*

Historically, suburbs in Bulawayo were established along racial lines which ceased in 1980 with Zimbabwe's independence from colonial rule (Zinyama, 1995). Today the divisions are socio-economic with the former white areas now known as low density suburbs being home to high-income residents (Manzungu, 2008). Similarly, the former black areas, now known as high density suburbs house the low-income people. Density describes the concentration of population in the respective areas. The medium density suburbs were landfills of open areas converted for residential settlements as population in the city increased (City of Bulawayo report, 2010). The old suburbs are those built during the colonial rule and the new suburbs are those that were constructed after independence (Byo Master Plan, 2000-2015).

3.2 Research design

The study employed mixed methods which include both qualitative and quantitative approaches. The quantitative approach focus was mainly on quantifiable data in terms of numbers and measures that can be analysed statistically and the deductive approach emphasized detailed planning prior to data collection and analysis (Neuman, 2000).

Qualitative research was generally interpretive (Creswell, 2000). The research made an interpretation of data by developing a description of an individual or setting, analysing data for themes or categories and making an interpretation or drawing

meanings personally or theoretically, stating the lessons learnt and offering further questions to be asked. The data was also filtered through a personal lens that is situated in a specific socio-political and historical moment.

Issues that were considered during the research design:

- a) Institutional issues – The Engineering Services department provides water supply, sewerage and sanitation services. Financial functions are handled by the City Treasurer's department eg. water billing and water meter reading. The Town and Planning department is responsible for designs and constant updates to the operational Bulawayo Master Plan (2000-2015). The Health Services department responsible for all health related businesses which among them include collecting and keeping track records of all waterborne and water related issues in the city. The Housing and Community department handles residential and household issues around the city eg. community based projects. What is the relationship among these departments and how are the water service activities harmonised?
- b) Legal framework – The Chamber Secretary department handles all BCC legal matters. What legal powers does the water utility have to implement the role of regulation to create competitive pressures, set prices and quality standards, establish targets for investment and maintenance and ensure that the benefits of efficiency gains are passed onto consumers?

Figure 3.1 shows the general organisation chart for BCC indicating the relationship of the five main departments and with those directly involved in day to day activities with water services indicated below the dashed line. The water services department is indicated in the enclosed dotted area. The department of Housing and Community authorised and confirmed the household questionnaire generated for the survey while the selected suburbs for the household survey exercise were authorised by Town and Planning department. The Chamber Secretary department was not available for interviews during the time of study so secondary sources of information from other departments had to be utilised.

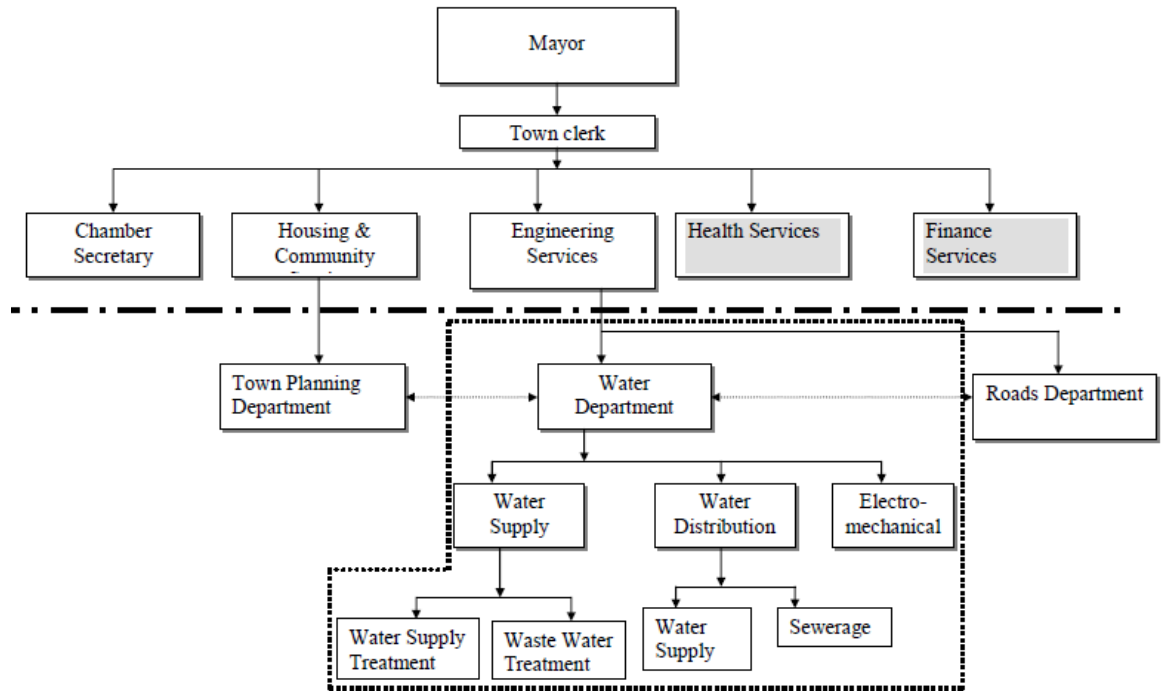


Figure 3. 3: General organisation chart for BCC (Adapted from Byo Master Plan 2000-2015)

Table 3.4. shows four categories used to generate the key informant interview guideline which include general information, water supply, customer services provision and external factors. The same interview guideline was administered to key informants of all relevant departments. Factors used to analyse each category were open to further discussions depending on the department. The key informant interview questions generated from the guideline are shown in Appendix 1.

Table 3. 4: Key informant interview generation guideline

Category	Factors used to analyse category
General information	History of authority Functions of the organisation Type of consumers
Water Supply	Sources of water Production vs. Demand Water losses Costs and revenues
Customer Services Provision	Communication channels Affordability Customer operator relations Customer complaints
External factors	Marketing strategies Existing roadblocks

Table 3.5. shows three categories used to generate the household questionnaire and the main factors used to analyse each category. The three categories are accessibility, reliability and consumer perception.

Table 3. 5: Household questionnaire generation guideline

<i>Category</i>	<i>Factors used to analyse category</i>
Accessibility	Pipe water supply system Household main water source Per capita water used Seasonal water shortage
Reliability	Duration of water supply Water supply pressure
Consumer Perception	Water quality perception Affordability Customer operator relations Customer complaints

The same questionnaire was administered to selected households in all the three different types of socio-economic suburbs as described in Table 3.6. The questionnaire generated from the guideline is shown in Appendix 2. The consumer survey study focused on domestic consumers and was carried out in 6 residential areas: 2 high density, 2medium density and 2 low density suburbs (Table 3.6).

Table 3. 6: Sampled residential areas for household survey

<i>Description</i>	<i>Low Density Suburb</i>	<i>Medium Density Suburbs</i>	<i>High Density Suburbs</i>
Old	Suburbs	Romney Park	Sizinda
New	Selbourne Park	Mahatshula	Emganwini

Industry, institutions and commerce were not included in the customer survey study. In order to compare findings, an old suburb and a new suburb were selected in each residential area respectively as shown in Table 3.6. This was done to consider service reliability of aged pipe distribution systems and the existences of pilot studies carried out on water audits which confirm the type of leaks, quantities of wastage with the subsequent need of actions having been evaluated (BWCP, 2001).

Figure 3.1 is a map of Bulawayo city showing positions of residential areas selected for the household surveys.

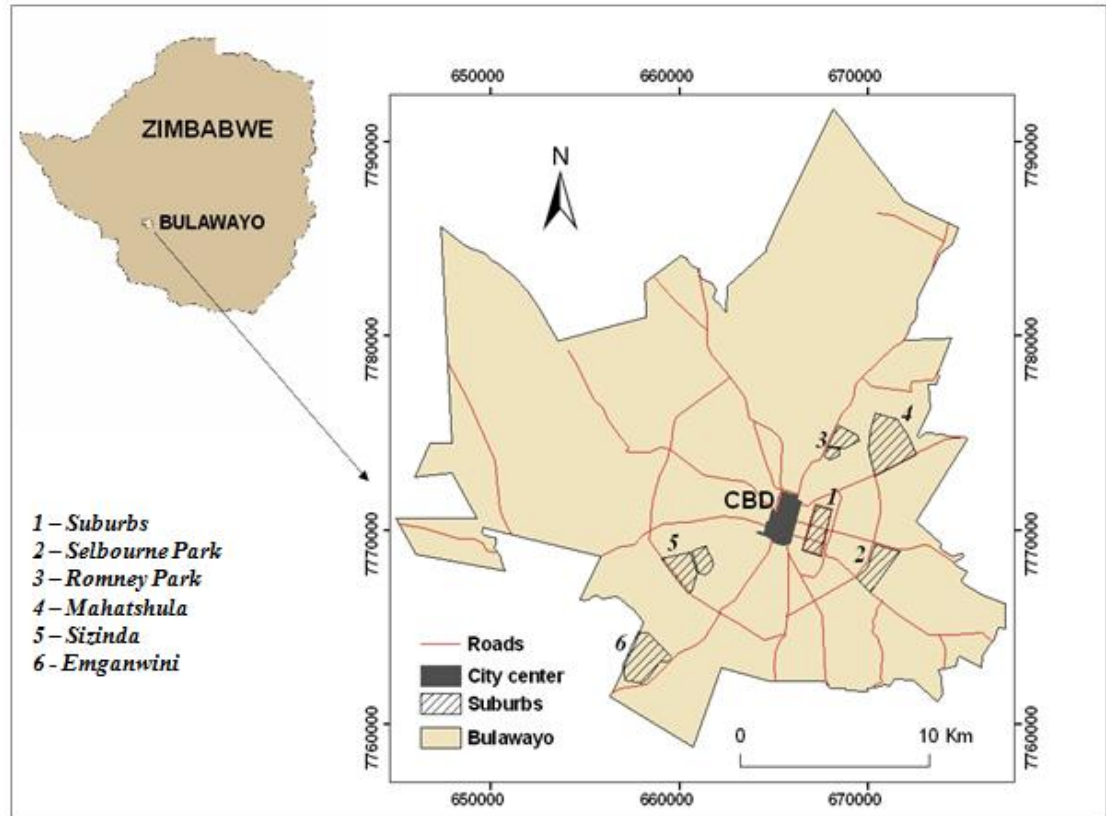


Figure 3. 4: Map of Bulawayo, Zimbabwe showing household survey study area (Adapted from Byo Master Plan 2000-2015)

According to the purpose of the study, to the population size and the available resources, the sample size of 200 was adopted with 10% as precision level, 95% level of confidence and 0.5 degree of variability (Kish, 1965). Equation 3.0 was used to determine sample size:

$$n = \frac{N}{1 + N(e)^2} \quad \text{Eqn 3.0}$$

where N = population size,
n = sample size,
e =desired level of precision

Table 3.7 indicates that a total of 255 questionnaires were administered through face to face interviews to the selected residential areas and of this number 240 were used for reporting as the rest were either incomplete or incorrectly filled out.

Table 3. 7: Survey sampling size for different residential areas

<i>Residential area</i>	<i>*No. of housing units</i>	<i>% of housing unit total</i>	<i>Target Sample size</i>	<i>Actual Sample size</i>	<i>Valid Sample size</i>
Emganwini	6 255	50.4	101	105	102
Sizinda	2 082	16.8	34	40	36
Romney Park	457	3.7	7	30	26
Mahatshula	2 091	16.8	34	40	36
Suburbs	698	5.6	11	20	20
Selbourne Park	830	6.7	13	20	20
Total	12 413	100	200	255	240

*Source: *BCC Department of Housing and Community Services, (2006)*

Inorder to guarantee quality assurance of household questionnaire administration:

- Five enumerators of undergraduate level from a local university in Bulawayo who have knowledge of local languages were employed to assist in the survey exercise,
- Respondents to the household questionnaires had to be aged 18 years and above,
- Respondents had to be responsible for all or most of the monitoring of water usage during the periods of water rationing or the payment of monthly water bills or both,
- Respondents also had to know how much water their household usually consumed every day.

3.3 Data collection methods

In order to fulfil the objectives of the study, data was collected using structured questionnaires and unstructured interviews. A structured questionnaire contained a lists of questions to which an individual has to respond by choosing his/her best appropriate answer from the options provided (Ogunniyi, 1992). Interviews can be defined as a conversation with a purpose of gathering information (Behr, 1983).

Purposive sampling (Sanchez, 2006) was used in identifying key informants and asking informants to indicate individuals and documents that provided insightful

information regarding the study. The concept of saturation (Sanchez, 2006) informed the sample size for the study, which states that the number of people to be interviewed is not specified at the beginning of the research but the interviewer continues to collect data until a point that no new information is emerging.

The survey sample size for each residential area considered the total number of housing units in each area which was safely assumed to represent response level of consumers. A survey aims to give systematic, representative and reliable information about a particular research population (Pratt and Loizos, 2002). Baker (2004) defines a sample as a set of elements or units drawn from a larger whole of all elements: the population. Depoy and Gitlin (2005) put forward that the main purpose of sampling is to select a sub-group that can accurately represent the population the intent being to draw accurate conclusions about the population by studying a smaller group of elements. He further argues that the enumeration of the population is the sampling frame which is the empirical representation of the population. For the purposes of this study the operational Bulawayo Master Plan (2000-2015) for residential areas was the sampling frame from which the individual elements were selected.

Household questionnaire generation involved asking randomly selected people a series of formal questions, writing down their responses and subsequently analysing them (Pratt and Loizos, 1992). Information was elicited by directive and non-directive probe questions which informed the development of a questionnaire which was piloted to remove all sources of error and weakness. The questionnaire was pretested on 30 households (5 people from the 6 suburbs selected for the study) to erase ambiguities. One standard questionnaire was developed after the pre-test and was administered to all households in the low, medium and high density suburbs. The questionnaire was designed to get information concerning accessibility, reliability and the consumer perception on water supply service quality (Kimey *et al.*, 2008).

Systematic convenience sampling was used in selecting the households to be interviewed (Depoy and Gitlin, 2005). This involves determining a sampling interval width and then selecting every Kth element from a sampling frame. For this study the 3rd house along the selected streets was interviewed from the randomly selected

starting point. However, based on the inclusion criteria, households that were willing to participate in the study were interviewed.

3.4 Data analysis and presentation

The relative performance of the utility was assessed based on the achievement of public policy for private sector water services provision in relation to four broad performance categories (Tynan and Kingdom, 2002). The findings were supported by information gathered from key informants, annual reports, financial statements and literature review. Data was presented in the form of tables, bar graphs and line graphs showing trends.

The quantitative data collected through the customer survey questionnaires was analysed using the Statistical Packaging for Social Sciences (SPSS Version 16.0). Responses given from the open ended questions derived from the semi structured interviews were examined to derive categories, which were coded and in effect, changed into a closed ended response set on a post hoc analytic basis. Thus numerical coding scheme based on the range of responses obtained was developed and codes were assigned to each subject then the numerical response was then analysed. Data was explored specifically for distribution trends and frequency responses. Cross Tabulations were used to compare findings from the different suburbs and presented in the form of graphs.

3.5 Ethical considerations

Ethical issues in research are concerned mainly in balancing the right of people for privacy, safety, confidentiality and protection from deceit with the pursuit of scientific endeavour (Pilot and Hungler, 1998). The Bulawayo City Council Authority was engaged from inception, as the current water services provider of the city of Bulawayo. In addition consent was sought for each household before the interview and the purpose of the interview was clearly explained beforehand.

4. RESULTS AND DISCUSSION

4.1 Determination of operational performance indicators for BCC

4.1.1 Efficiency of investment

Unaccounted for Water

In this study UfW was calculated as the difference between water supplied and water sold *i.e.*, volume of water ‘lost’ expressed as a percentage of net water supplied (McIntosh, 2003; IB-NET,2006; IWA, 2009). This represents water that has been produced and is ‘lost’ before it reaches the customer either through leaks, theft or through legal usage for which no payment is made. Table 4.1 shows estimated water consumption levels in the City of Bulawayo by BCC. The consumption for Industry is over-estimated as key informant sources confirmed that there is suppressed demand due to the inactive industry. The estimated UfW therefore is estimated at between 30-40%, assuming suppressed demand in the inactive industry and consumption is maintained at 140,000m³/d. The domestic water allocation is estimated at 45% with household consumptions of approximately 450 l/household/d.

Table 4. 1: BCC estimated water consumption levels

<i>Category</i>	<i>%</i>	<i>*Estimated Number of Consumers</i>	<i>Total Consumption, m³/day</i>	<i>Unit consumption/ household/d</i>
High Density	30	94,595	42,000	450
Low Density	15	47,297	21,000	450
Industry	25	13,966	35,000	-
System losses	20	Leaks, pump breakdowns	28,000	-
Non Revenue	10	Fire and Municipal Premises	14,000	-
TOTAL	100		140,000	

Source: *Byo Master Plan (2000-2015)

In 2002 UfW was estimated at 18%, while in 2006 the system performance had deteriorated to an estimated UfW of 54%. Chinyama *et al.* (2007) assessed the metering and billing in BCC and estimated the 2002 UfW at 20%, with water production at 100,000 m³/dy and consumption at 100 l/cap.d and domestic water allocation estimated at 55%. Their study found that no actual water losses could be established because of metering and billing inaccuracies from over estimation of consumption. This implies that the UfW indicator captures physical losses and commercial losses due to inefficient billing or illegal connections. Thus high levels of UfW water may indicate poor system management and poor commercial practices as well as inadequate network maintenance.

The best practise UfW level is 20 % (Table 2.1). This indicates that in 2002 BCC water services system performance was at its best with UfW estimated at 18% (see Table 4.2) and had severely deteriorated in the year 2006 to 54%. Among some factors influencing performance in 2002 was the implementation of the Bulawayo Water Conservation Project (BWCP) in 2001 which was witnessed by the rehabilitation of the distribution network system and conservation campaigns to consumers. In 2006, performance was almost crippled due to the economic downturn of the country with high rates of inflation estimating over 1,000% (BCC, undated). In 2010, performance is assumed to be on recovery due to the USD\$ period which has fairly stabilised the economy of the country (BCC, undated). Key informants confirmed rehabilitation work has since commenced with the recovery of the economy through implementation of meter replacements and pipe replacements.

Water production and consumption

The water production indicator was used to measure total water supplied for distribution while the consumption indicator represents the urban water demand in m³/d as indicated in Table 4.2. The difference in the water production and water consumption indicators reflects the UfW, which is shown as a percentage of water production in Table 4.2.

Table 4. 2: Efficiency of investment performance indicators

<i>Indicator</i>	<i>2002</i>	<i>2006</i>	<i>2010</i>
Water production, m ³ /d	120,000	150,000	215,000
Water consumption, m ³ /d	98,000	69,900	140,000
UfW,%	18	54	35

Adapted from BCC, 2002, 2006 and 2010

Unrestricted demand represents household consumption at 450 l/d and restricted urban water demand at 350 l/d when water rationing takes place. WHO (2004) guidelines recommend consumption at no less than 60 l/cap.d for metabolic and hygienic needs in households with a flush toilet. Figure 4.1 shows the average household water consumptions for different socio-economic groups obtained from the household survey exercise.

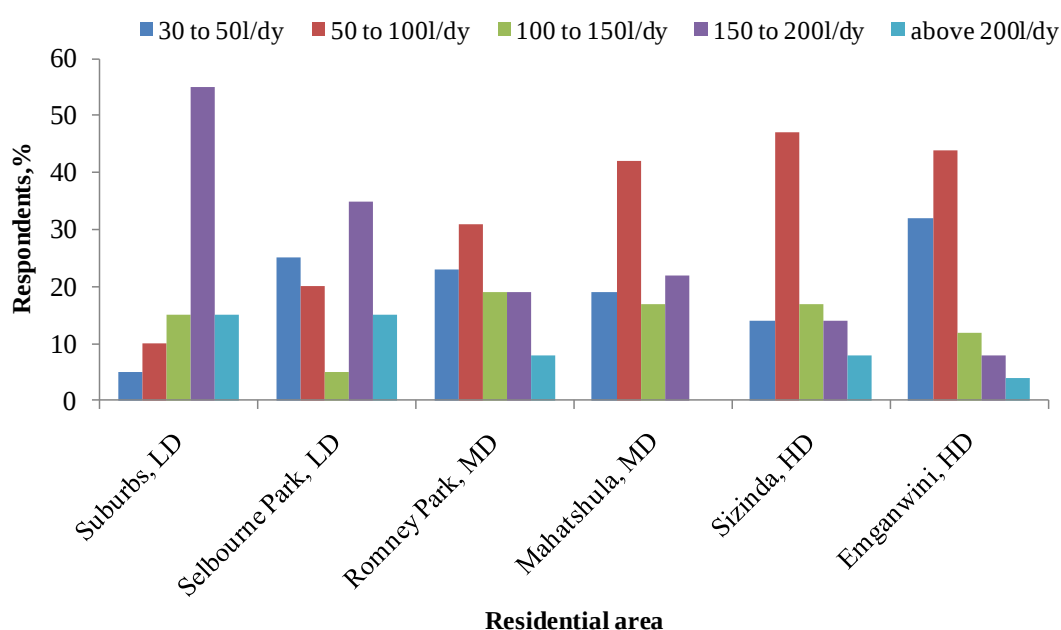


Figure 4. 1: Household survey results on consumers' average household water consumption, April 2011

Household consumption figures were estimated by a 20 litre bucket and respondents had to state how many buckets of water they would use per day for the household. Figure 4.2 shows the average household sizes for each of the residential areas which correspond to the average consumption per day from figure 4.1.

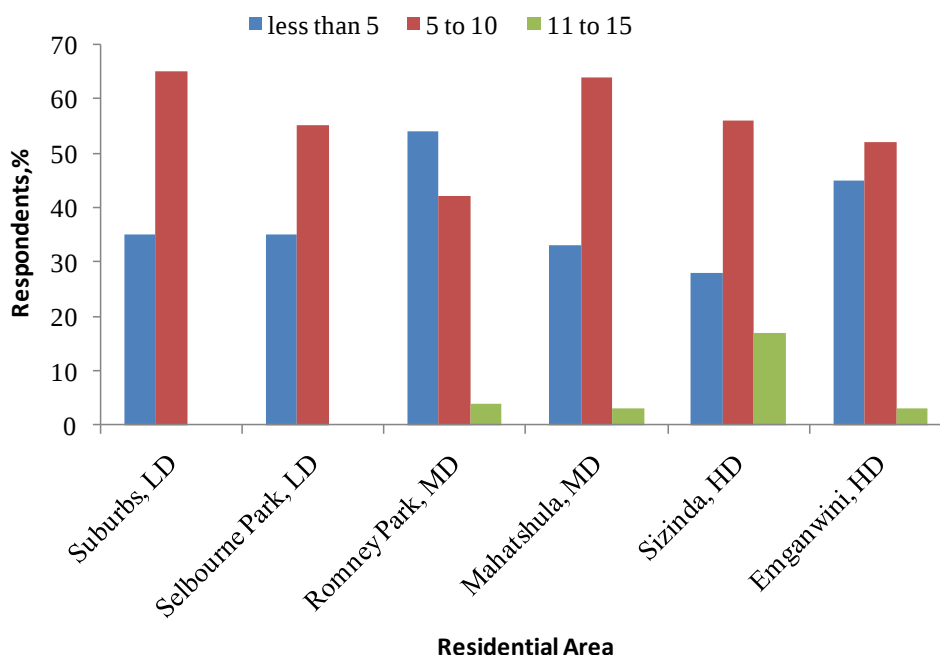


Figure 4. 2: Household survey results on consumers' average household size, April 2011

The respondents were asked to estimate household size including babies as it was revealed that households with babies consumed about 30 litres more water than the same household without a baby. The low density households had an average household size of 6 persons inclusive of domestic servants both in the households and gardens and their respective families residing in the cottages. In the medium and high density households most household sizes were influenced by the number of lodgers renting extra rooms within the household hence in some instances the household size range was 11 to 15 persons. Table 4.3 shows the estimated consumption which is the restricted urban water demand for different socio-economic groups ranging from 50 l/d to 200 l/d. The customer survey exercise revealed that households in the low density are consuming up to 200 l/d with an average household size of 6 persons.

Table 4. 3: Household consumption figures for different socio-economic groups

<i>Residential area</i>	<i>Category</i>	<i>*Number of housing units</i>	<i>Average household size, no.</i>	<i>Average Consumption per household, l/d</i>	<i>Total Consumption, l/d</i>
Suburbs	Low density	698	6	200	139,600
Selbourne Park	Low density	830	6	200	166,000
Romney Park	Medium density	457	7	150	68,550
Mahatshula	Medium density	2,091	8	100	209,100
Sizinda	High density	2,082	13	100	208,200
Emganwini	High density	6,255	11	100	625,500
Total		12,413			1,416,950

Source: *Department of Housing & Community Services BCC, 2006

According to the respondents the estimated consumptions figures are from stored reserves when water cuts are prevailing in the city. The extrapolated consumption figures in Table 4.3 are already below the restricted consumption of 350 l/d per household during water rationing by BCC. Key informants in the engineering services department confirmed that demand from inactive industry and commerce was below the allocated demand from BCC. This implies that consumers in the city of Bulawayo are currently consuming less than the estimated consumption of 140,000 m³/d deduced by BCC. Absolute figures for water consumption for each category were extrapolated from dividing the average household consumption by the average number of persons in the household. Per capita consumption is at an average of 35 l/cap.d for low density areas, 20 l/cap.d for medium density and 10 l/cap.d for high density consumers. The extrapolated consumption figures imply that consumers do not consume at least the minimum daily requirements within the range of 60 to 80 l/cap.d enough to take care of basic hygiene needs according to WHO (2004). The Sanitation Manual Design (2000) for Zimbabwe cites 60 to 250 l/cap.d consumption for households with multiple connections.

In a study carried out by NORPLAN (2005), the investigations on water use, water conservation and affordability in the city of Bulawayo, found that water conservation is firmly entrenched in consumers. Studies showed that respondents indicated that

they practice water conservation measures despite the lifting of water rationing. The report further indicates that among domestic users, the most common methods of conservation were using grey water for gardening, not using a hosepipe, flushing the toilet infrequently and doing laundry once a week. In the non-domestic sector, the most common methods of conservation were checking the water meter regularly, instituting a water audit, installing low-flush toilets and infrequent flushing, using borehole water, using recycled water in the manufacturing process and not using a hosepipe to water the garden. This probably explains the low consumption figures for all surveyed residential areas.

Metering level

This was the number of connections with operating meter as a percentage of total connections. The number of water supply connections was derived from the number of billed accounts from the financial services department which were compared with the number of residential stands from the housing department. The engineering services department installs meters on all buildings within BCC's area of responsibility. Costing of water use relies on meter reading. Estimates are used for households with stolen or faulty meters. The metering level was then deduced from the number of estimated billed accounts which were then assumed to have operational meter in place as a percentage of total connections.

Table 4.4 shows the number of water supply connections and the corresponding metering levels for the years 2002, 2004 and 2006. The number of water supply connections has increased over the years, while the metering level has remained constant around 90%. This is because it is compulsory that a meter is installed with every new water connection (BCC, 2002). The metering of water consumption allows customers to influence their water bills and provides water supply utilities with tools and information to allow them to better manage their systems. Best practise value for metering level is 85 % from Table 2.1.

Table 4. 4: Efficiency of operations and maintenance

<i>Indicator</i>	<i>2002</i>	<i>2006</i>	<i>2010</i>
Water supply connections, #	106,050	112,400	152,800
Metering level, %	90	88	90
Population served, #	676,700	706,900	738,600

Adapted from BCC report, 2002, 2006 and 2010

Studies carried out by Chinyama *et al.* (2007) found that some institutions such as police camps which have a number of households have bulk meters which have a negative impact on water demand management practises due to metering and billing inaccuracies because of over-estimation of consumption. They concluded that individually metering and billing properties could reduce the level of water consumption and that water losses in the system could then be more accurately estimated.

Population Served

This was defined as the population with access to water supply from BCC, either with direct service connection or within reach of a public water point. This study considered the total population of Bulawayo as under the BCC utility's area of responsibility. The population of Bulawayo was estimated at 676,650 in 2002 (CSO, 2002). Table 4.4 illustrates how the number of water supply connections has increased with the projected population increase. According to the city's operational Master Plan (2000 - 2015), the annual growth rate for Bulawayo was estimated at 2.7% in the year 2000. The growth rate has since increased during the years of economic downturn when there was massive urban migration into the city as witnessed by a great rise of the informal sector and overcrowding.

4.1.2 Efficiency of operations and maintenance

Staff per 1,000 connections

This was defined as the cost of labour input in the daily operation of a utility measured as a ratio of inputs to outputs. Table 4.5 shows the number of staff per 1000 connections and best practice suggests a value of 5 or less for efficient performance. In 2002 and 2006, the utility was characterised by overstaffing as the

number of employees was above the required BCC staff establishment of 1,286. In 2010, however the indicator is 4.43 which is within the acceptable range but the reality is that there is a high staff turnover of skilled personnel within the water services department which has negatively affected operations (BCC, undated). The composition of the indicator then points to the abundance of unskilled personnel which then distorts the expected interpretation of the output of 4.43 being within the acceptable best practice range. In Africa staff per 1,000 connections is estimated within 4 to 45 (Mwanza, 2006).

Table 4. 5: Efficiency of operations and maintenance indicators

<i>Indicator</i>	<i>2002</i>	<i>2006</i>	<i>2010</i>
Water supply connections, #	106,050	112,427	152,806
Water and Sewerage services section employees, #	1,301	1,497	678
Staff per 1,000 connections	12.27	13.32	4.44

Adapted from BCC, 2002, 2006 and 2010

Assuming BCC is operating at full staff establishment of 1,286 in 2010, the staff per 1,000 connections would be 8, which is still way above the best practice target of 5. A high ratio may indicate inefficient use of staff or they may reflect relaxed employment practices, often a result of political interferences in the water utility (Tynan and Kingdom, 2002). It may also mean that single water connections are serving multiple households (Chinyama *et al.*, 2007).

4.1.3 Conclusion

Table 4.6 shows the results of the technical-operational performance indicators from the conceptual framework developed. The results indicated are below expected best practise targets. UfW is estimated at 35 % which is above the best practise target of 20 %. Water consumption is at an average 20 l/cap.d which is far below the target of 60 l/cap.d. Metering level is at 90 % and population served is at 95 % assuming total population of Bulawayo city as under BCC utility's area of responsibility. The staff per 1,000 connections is at 4.43.

Table 4. 6: Conceptual framework results on objective 1 for 2010

<i>Technical-operational performance indicator</i>	<i>Description</i>	<i>Target</i>	<i>Results</i>
Unaccounted for Water	Volume of water 'lost' as % of net water supplied.	<20 %	35 %
Percentage of metered connections	No. of connections with operating meter as % of total connection	>85 %	90 %
Staff/1000 connections	Ratio of inputs to outputs	< 5	4.43
Water production & consumption	Supply to meet demand, m ³ /d	60 l/cap.d	20 l/cap.d
Population served	% of population with either direct or within reach of service connection	100 %	95%

The BCC water supply sector has the characteristics of a natural monopoly due to the huge investments required to build the network. The potential for introducing competition needs to be investigated with the aim of reducing inefficiencies that have been argued to exist in the process of supplying water. The evidence of these inefficiencies has been highlighted by the levels of UfW and the staff per 1,000 connections. Introducing competition through privatisation in the production and cleaning of water may reduce these inefficiencies.

4.2 Determination of financial performance indicators for BCC

4.2.1 Financial sustainability

Average tariff per m³ sold

This was defined as the ratio of a utility's total annual direct billed revenue to total annual water consumption, ie. volume of water sold. Direct revenue is the actual amount billed for water services which includes domestic, commercial and industrial revenue but not bulk water revenue. Revenue from other sales, sundry income or interest received is excluded, as are direct revenue subsidies. Average tariff measures the notional average tariff of the utility and it is not the same as the actual tariff charged which may include tariff bands and different tariffs for domestic and industrial customers. Figure 4.3 shows the trend of the average tariff over the years

2000 to 2006 and how the impacts of hyper inflation (WHO-UNICEF, 2010) affected the costing of the water.

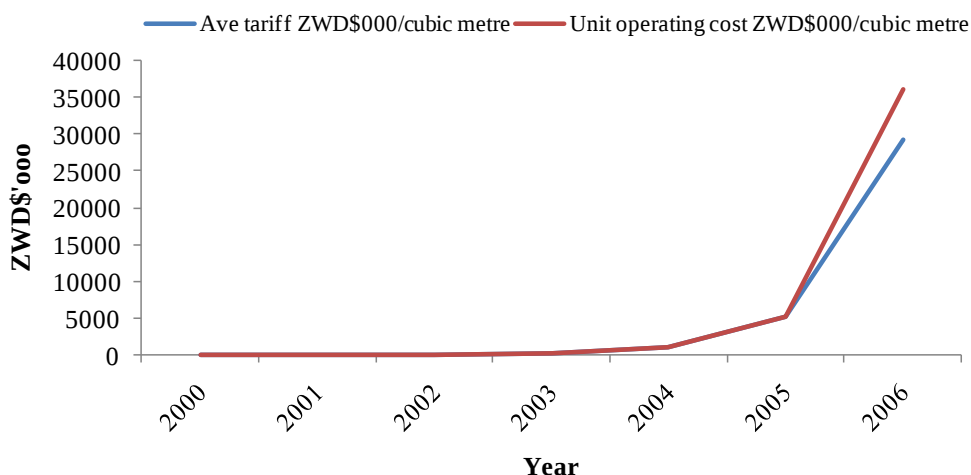


Figure 4. 3: Costing of water by BCC for the years 2000 to 2006

There was a sharp increase in the cost of water during the years 2005-2006, in an effort to try and cost water according to unit operating costs (BCC, undated). According to key informant sources in the financial services department, the number of complaints from consumers regarding water billing reduced significantly to near zero as consumers benefited from the illegal mobile bureau de change. A key informant stated that:

The nature of complaints has not changed much over the years but in terms of water charges, complaints went quiet as from 2006 to 2009 due to 'burning'. This crippled operations in the utility as the value of money was diminished before any development could be carried out. BCC then devised a plan in support of residents to pay water levies to procure chemicals for water treatment.

The 2010 average water tariff per cubic metre was US\$0.72 which is within margin of the best practise value of US\$0.76 as shown in Table 2.1.

Unit operating cost per m³ sold

The unit operating cost per cubic metre sold reflects the cost of providing water at the customer take off point. This was defined as the ratio of a utility's total annual operating expenses and total annual volume of water sold (Mwanza, 2006). The

operating cost for a water supply consists of the running costs (including salaries, energy, chemicals) and maintenance costs (spares, repairs). Figure 4.3 shows how BCC has always targeted to cost water charges according to unit operating cost as the line graphs are overlapping until 2006 when hyper inflation in the country began to affect operations. This saw BCC failing to cover running costs, among them employees salaries, resulting in the loss of skilled personnel to seek 'greener pastures' and failing to afford procurement of chemicals for water treatment (BCC, 2006). Consumers were the most affected as water quality and availability deteriorated which resulted in the nationwide cholera epidemic in 2008 to 2009 (MoHCW, 2009).

The unit operating cost of production per cubic metre was US\$0.72 for the year 2010 deduced from figures in financial statements. For best practise, the unit operating cost of production must be at least equal to or less than the average tariff for sustainability. (Mwanza, 2006) Muhairwe (2010) in his investigations on business approaches to the management of water and sanitation and experiences in the water company, NWSC of Uganda, encourages public water services to at least recover operating costs for the sustainability of operations even though there is the burden of balancing equity with efficiency.

Operating cost coverage ratio (OCCR)

The operating cost coverage ratio is the key measure of the utility's ability to cover its operating costs which exclude interest and depreciation from revenues, without reliance on external subsidies. This was defined as the ratio of total annual billed revenues to total annual operating costs (excluding interest and depreciation). The average tariff per m³ sold, unit operating cost per m³ sold and the OCCR, give insight into the financial discipline of a utility, its ability to cover operational costs with revenues from tariffs and the general commitment to pursue a commercial approach to the provision of a public service (Castro and Mugabi, 2009; Muhairwe, 2010). The OCCR is also defined as the inverse of the working ratio (Tynan and Kingdom, 2002).

Figure 4.4 shows BCC's operating cost coverage ratio over the years 2000 to 2006. In the year 2000 the OCCR was 0.55 and declined to 0.25 by the year 2002. This

reflects how the utility was tying budget to the upgrade of operational performance on the rehabilitation of the distribution network (BWCP, 2001). The successful implementation of the project is reflected as the OCCR immediately increases in 2003 to 0.4 but is short-lived as the ratio plunges down again in 2004 to 0.28 before it rises again to 0.48 in 2006. The rise of the OCCR between 2004 and 2006 does not necessarily reflect magnificent performance but shows how the effects of high inflation rates can give misleading financial trends (BCC, 2006). The OCCR for BCC deduced from the figures provided in the financial statements for the year 2010 was 0.6. This implies that BCC is unable to cover its operational and maintenance costs from tariff revenues. An OCCR value greater than one means that revenues from tariffs cover the operating and maintenance (OandM) costs. A value less than one indicates that a utility is not able to cover its OandM costs. An OCCR value equal to one means that a utility barely covers its OandM costs. Best practise target for OCCR is 1.2 (Mwanza, 2004; Castro and Mugabi, 2009) while Tynan and Kingdom (2002) proposed a benchmark level of 1.5 for developing countries.

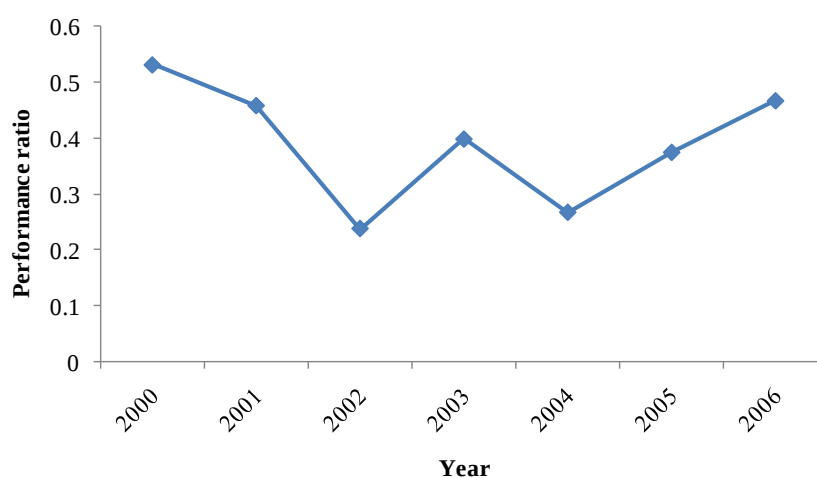


Figure 4. 4: BCC operating cost coverage ratio performance from years 2000 to 2005

Msuku *et al.* (2010), in their comparative assessment on performance of water utilities in Malawi found that Lilongwe Water Board (LWB) achieved a working ratio of 0.85 (OCCR of 1.2) and Blantyre Water Board (BWB) achieved a working ratio of 0.9 (OCCR of 1.1). The figures imply that the water boards are able to recover enough revenues from tariffs to cover operational and maintenance costs. Castro and Mugabi (2009) in their report state that NRWB achieved OCCR of 0.8 based on billings and 0.7 based on actual collections while LWB achieved OCCR of

0.7 based on billings and 0.55 based on actual collections. The difference in findings of financial performance of the water boards could be attributed to the different composition of each researcher's definition of the OCCR.

Collection period

The collection period was calculated as the year end accounts receivables as a share of annual revenues, expressed in day equivalents. Figure 4.5 shows the trend of the collection period for BCC during the years 2000 to 2006. The period 2000 to 2002 shows that the collection was fairly constant at around 9 months but improved to 7 months by 2003 as a result of the massive public awareness campaigns from the implementation of the BWCP (2001). The collection period remained relatively constant until 2005 to 2006 which reflects an even further improvement to less than 3 months collection period. The best practise target is less than 3 months collection period for well performing utilities shown in Table 2.1. This may reflect as good performance from BCC during 2005 to 2006 but this was as a result of the impacts of inflation which saw consumers benefiting from the exercise at the expense of service delivery.

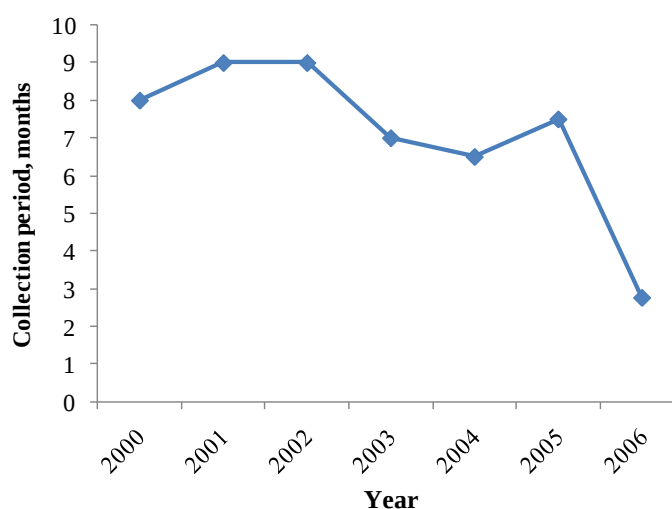


Figure 4. 5: Average collection period for consumers with BCC during the year 2000 to 2006

Key informants within the utility confirmed that although consumers could afford to pay bills for the whole year, the value of the money diminished before any meaningful development could be implemented. For the year 2010, collection period was 8 months calculated using debtors formula given as debtors divided by sales x

365 days. This implies that most of the funds for BCC were locked up with bad debtors. Poor collection efficiency is usually blamed on customers but the utility may also be at fault for delayed and faulty billing, inadequate responses to consumer queries on billings, poor customer service and a lukewarm effort to collect overdue accounts (Tynan and Kingdom, 2002; Chinyama *et al.*, 2007).

Collection Ratio

This was defined as the ratio of the utility's actual revenues collected and total billed revenues, expressed as a percentage. The effectiveness of the collections process is measured by the total amount collected as a percentage of the billed amount (Baietti *et al.*, 2006; Yguinez, 2009). Figure 4.6 shows the trend of the collection ratio for BCC from year 2000 to 2006. In 2000 the collection ratio was at 20% and improved gradually to 42% by 2002 due to the implementation of the public awareness campaigns of the BWCP in 2001. The collection ratio remained fairly constant over the years at around 40% until 2006 when it shot up to 78%. A collection ratio of 73% is recommended for best practise as indicated in Table 2.1. This implies that in 2006 BCC performed well in terms of meeting target performance of collection ratio. However the reality of the impacts were not to the benefit of BCC as the performance was influenced by prevailing high inflation rates which eroded the value of the collected income before any meaningful development could take place. The collection ratio is estimated at 35% for 2010.

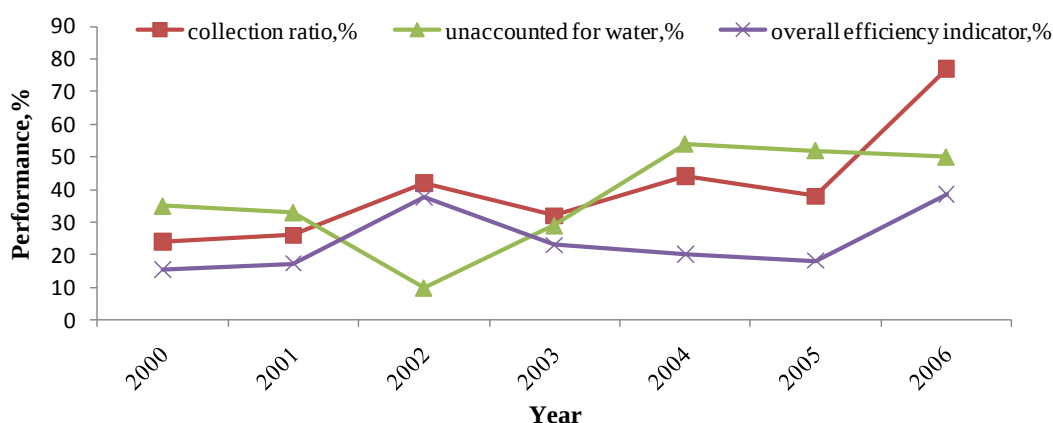


Figure 4. 6: Relationship between collection ratio and unaccounted for water for BCC for the years 2000 to 2006

Metering and billing inaccuracies mostly result from high levels of faulty metering and over estimation of consumption for billing (Chinyama *et al.*, 2007). This implies that metering and billing practices influence levels of willingness to pay and water consumptions by different consumers.

4.2.2 Overall efficiency indicator

The Overall Efficiency Indicator (OEI) attempts to provide a global measure of utility efficiency by comparing the volume of water for which the utility collects revenue and the total volume of water it produces (Mwanza, 2004; Baietti *et al.*, 2006; Castro and Mugabi, 2009). The OEI indicator is a function of non-revenue water and collection ratio as illustrated in Fig. 4.6. The OEI is best representative when unaccounted for water is at its minimum and the collection ratio at a maximum as shown in the year 2002 with OEI at 38%. In 2006 the OEI was at 38% once more but misrepresented in that while the collection ratio was at its maximum due to high inflation rates in Zimbabwe, there was a high value of UfW. This reflects the different socio-economic factors that influence performance of BCC and the reason not to interpret indicators rigidly.

The OEI indicator seeks to ensure meaningful comparison between water utilities, although not entirely perfect, providing a good indication of the overall position of a utility and allowing one to make an overall conclusion on performance. The results presented in Figure 4.7 indicate the best recorded performance to the date of publication of the report. The assumptions made over this graph are that the efficiency indicator has remained constant and still need to improve from the recorded figures onwards.

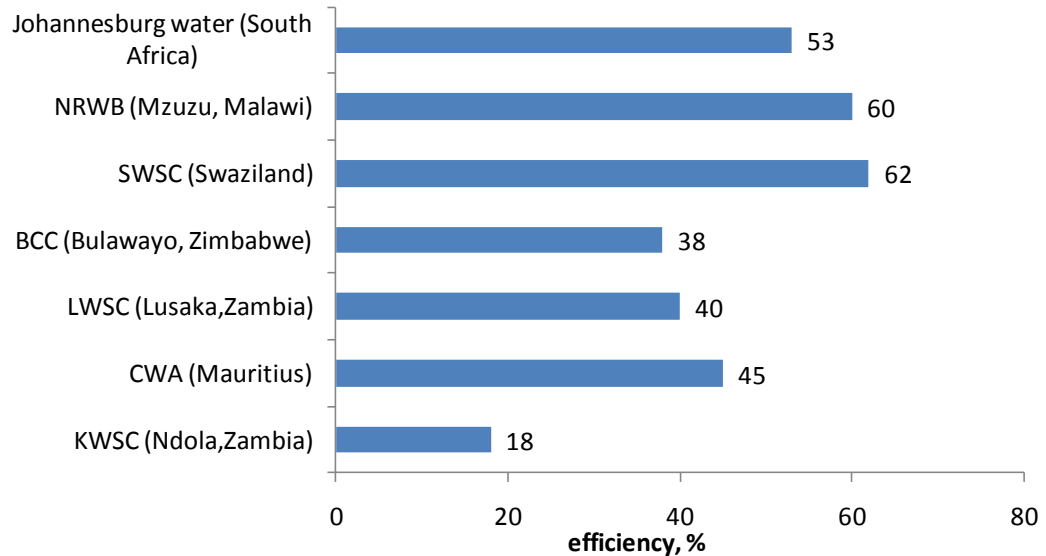


Figure 4. 7: Overall efficiency indicator of urban water supply utilities for selected Southern African countries (*Adapted from Water Operators Partnership-Africa Utility Performance Assessment, 2010*)

The best practise target is 66% for a utility to be defined as performing efficiently as proposed by Water Operators Partnership- Africa Utility Performance Assessment Report (2010). From the Southern African countries presented in Figure 4.7, none of the utilities have achieved the target figure. However, there are indications that Swaziland Water Services Co-operation (SWSC) of Swaziland and Northern Region Water Board (NRWB) of Malawi are performing more efficiently as shown by the high figures of 62% and 60% respectively. BCC is lagging behind at 38% though performing more efficiently than Kafubu Water and Sewerage Company (KWSC) of Zambia which is at 18%. Lusaka Water and Sewerage Company (LWSC) of Zambia and Central Water Authority (CWA) of Mauritius are also not very far ahead of BCC, with efficiency indicators at 40% and 45% respectively.

SWSC of Swaziland operates under performance contracts with central government (Mwanza, 2006). The contracts have an average duration of five years and cover technical performance, service indicators, efficiency and financial indicators as well as human resource issues. The contracts are able to enforce penalties for poor performance. NRWB of Malawi is a state owned enterprise operating under commercial law (Msuku *et al.*, 2010). The water board is expected to generate adequate revenues that will make its business viable, sustainable and therefore develop appropriate and optimal business policies and strategies that will achieve its financial objectives. BCC is a municipal run water supply service. The degree of

flexibility of BCC is less and is also weakened by political interference. This explains how management setup of each water supply utility contributes to the performance of the services provided.

Msuku *et al.* (2010) in their comparative assessment of public water utilities BWB, LWB and NRWB in Malawi, found that financial performance indicators were above the best practise targets recommended for developing countries. The assessment further highlighted that overstaffing, high levels of UfW, huge debts and revenue in arrears owed by bad debtors had a negative impact on the financial sustainability of the water utilities.

4.2.3 Conclusion

Table 4.7 shows the results of the financial performance indicators from the conceptual framework. The unit operating cost of production indicator is meeting best practice as it is lower than the average tariff per cubic metre sold. The proposed average tariff is at US\$1.08 which is higher than the best practice value of US\$0.76. The OCCR is at 0.68 which is below the target of one. The target collection ratio is at 73 % but result from the study is far below at 35 %. Collection period is at 8 months above the target of 3 months. The OEI is at 23 % far below the target of 66 %.

Potential pricing policies that could reduce water demand for BCC are the use of taxes and subsidies. The challenge for practical policy making is that goals will need to be expressed in terms of volumetric reductions in demand. Taxation is also considered unfair especially to the low income households who may experience budgetary problems upon introduction of taxes. According to Pollit (2002), the achievement of the policy goals by the imposition of taxes is often a process of trial and error and the use of subsidies to advocate efficient use of water is inferior to the use of taxes.

Table 4. 7: Conceptual framework results on objective 2 for 2010

<i>Financial performance indicator</i>	<i>Description</i>	<i>Target</i>	<i>Results</i>
Average tariff per m ³	Actual amount billed per m ³ of water	US \$0.76	US \$0.72
Unit operating cost per m ³ sold	Ratio of utility's total annual operating expenses and total annual volume of water sold	< ave tariff m ³	US \$0.72
Operating cost coverage ratio, (OCCR)	Ratio of total annual billed revenues to total annual operating costs (excl. interests and depreciation)	> 1	0.68
Collection ratio	Ratio of actual revenues collected and total billed revenues	> 73 %	35 %
Collection period	Average time to collect outstanding revenues	< 3 months	8 months
Overall efficiency indicator	Ratio of total volume for which utility collects revenue and the total volume of water it produces.	> 66 %	22.7%

4.3 Assessment of public perception on performance of BCC

4.3.1 Responsiveness to customers

Cost of obtaining a new connection

Information gathered from household survey shown in Figure 4.8 indicates the average household income ranges for each residential area. About 55% of respondents in the low density area of Suburbs and 45% from Selbourne Park earn an average household income above USD\$900 with less than 10% earning less than USD\$180, the rest of which are in the range of USD\$180 to USD\$900. From the medium density suburbs of Romney Park and Mahatshula about 55% of respondents earn household income of between USD\$180 to USD\$900 while about 5% earn above USD\$900 and the remaining 45% below USD\$180. In the high density areas of Sizinda and Emganwini 55% of respondents earn a household income of less than USD\$180.00 and 45% between USD\$180 and USD\$900, the remaining 5% above USD\$900.

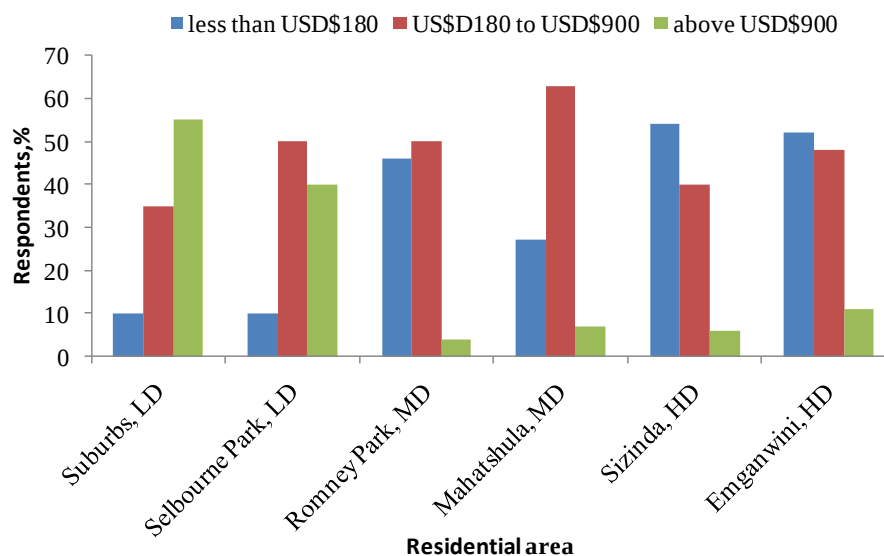


Figure 4. 8: Household survey results on consumers' average household income ranges, April 2011

Demographic data is normally available at Central Statistics Office but none was available for the USD\$ period at the time of study so information had to be sourced from the household surveys. During the pre-test questionnaire survey, respondents were not willing to give exact figures of their average household incomes as a result a range of income figures was generated based on literature review to the final questionnaire. Information regarding household incomes was released subject to respondents' inquiries on what they would benefit out of their willingness to participate in the exercise. This reflects on the limitations in accessing data regarding household incomes as respondents are likely to distort their responses.

The proposed cost of a basic water connection for BCC was at USD\$103.50 which is within the same magnitude compared to the capital cost of USD\$91.00 suggested by WHO (2004) for the Africa region. Best practise suggests cost of obtaining a new individual connection is at most 20% of average household income (Table 2.1). From the household survey the average household income for the high density consumers was less than USD\$180.00 and 20% of this is USD\$36.00. This implies that the basic water connection fees are not affordable to the majority of consumers. However, BCC devised a credit facility for water connection fees which is charged to the prospective water bill (BCC, 2010).

The regional differences in cost of a basic house connection are significant with up to more than USD\$100.00 difference between Africa and the Eastern Mediterranean for example. Africa has the lowest capital cost for water supply connections due to the existing challenge of inadequate service provision to the growing urban populations, in the context of the MDG's, where Africa lags far behind other regions (WHO-UNICEF, 2010).

Cost of water

The proposed tariff schedule by BCC takes into consideration those that cannot afford to pay through their scheme for vulnerable sections where the first 5,000 m³/d will be free water for all for domestic consumers only (BCC, 2010). The scheme further considers sending social workers to vet situations in households that cannot afford full cost of water services charged to them, and then BCC covers 50% of the bill charges to ease the financial burden on the household (BCC, undated).

The proposed average block water tariff was USD\$1.08, which lies within magnitude of the range of best practise of USD\$0.12 to USD\$1.16 (Mwanza, 2004; Castro and Mugabi, 2009). However, the selected best practise target is at USD\$0.76 from Table 2.1, which suggests that the current water tariff is high as indicated by majority of consumers in the medium and high density suburbs as shown in figure 4. 9.

During the household surveys, it was evident that households in the low density suburbs were more affluent and less densely populated than those in the medium and high density suburbs. As such, uses of water for landscaped gardens with lawns and fountains, functional swimming pools and borehole water use were used as proxy for affluence. Figure 4.9 shows consumers perceptions on cost of water provided by BCC from each residential area. Responses given were that either the cost of water was high, fair or low. According to key informants in the Financial Services department on average an estimated charge of USD\$75, USD\$45 and USD\$15 are billed to consumers every month to residents in the low density, medium density and high density respectively, assuming no interests are accruing on the accounts. During the household survey some residents managed to produce their water bill statements and about 80% of these had accruing interests. This reflects on affordability of water services to the consumers.

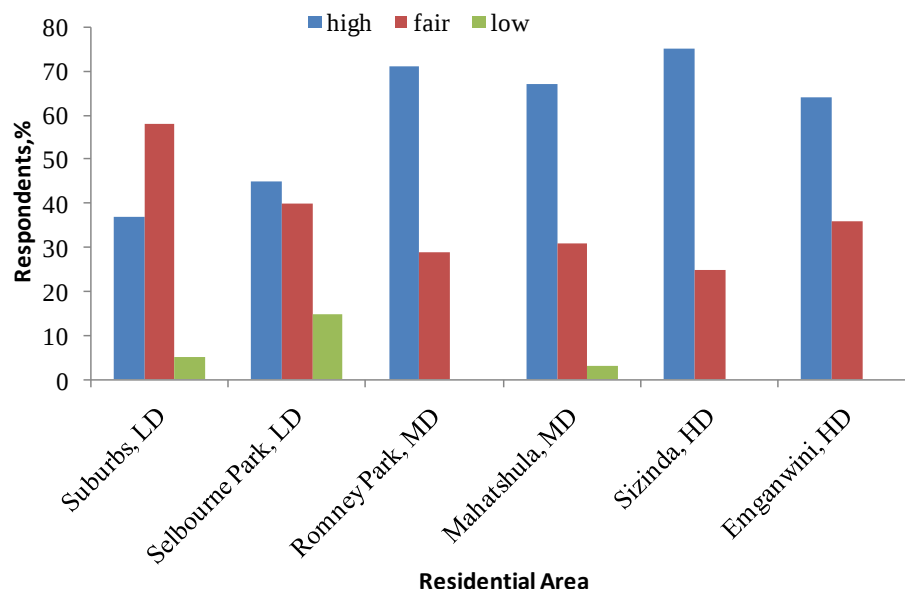


Figure 4. 9: Household survey results on consumers' perceptions on cost of water provided by BCC, April 2011

More than 60% of the consumers in the medium and high density perceived the water pricing as high, with about 55% of respondents in Suburbs and Selbourne Park perceiving it as fair. Best practise target for cost of water is that at least 75% of consumers should consider water as affordable (Table 2.1). During the fieldwork, some households in the low density suburbs were observed to have completely resorted to boreholes as their water source after BCC cut off supply due to consumers resisting payment of council bills.

Khanyakahle (2006), in her investigations of effective municipal payments in South Africa, found that most of the lower income households find their accounts difficult to understand and pay their accounts by cash. The higher income groups, it was found, made use of a variety of payment options such as cash, credit card and bank transfers implying that they have easy access to pay bills. This reflects that there is an observed low level of willingness to pay from consumers in the low density suburbs as evidenced by some residents in the low density suburbs who have resisted payment of council bills and resorted to more expensive sources of water.

Customer complaints

Figure 4.10 shows responses from household survey regarding nature of consumers' complaints to BCC. The major issues arising from the type of complaints were

related to water bills, pipe bursts and water quality. The household survey revealed that 50% of consumers in the low density areas were more concerned with the frequent pipe bursts which were perceived as increasing potholes on the roads which later caused damage to their personal vehicles. Among other perceptions were that flowing water compromised parking space for their visitors outside their homesteads and water seepages into their yards interfered with their gardening and landscape. About 38% complained about the quality of water and how it stained their swimming pools which increased their cleaning costs. Residents in the medium and high density also expressed concern over pipe bursts which led to frequent water cuts. However, about 70% of all respondents state that their main complaints to BCC were in relation to water bill issues like cost of water, over-estimated consumption and interests charged on accumulating debt. Chinyama *et al.* (2007) in their studies found that major complaints relating to water bills included billing errors and accounts query issues due to inaccurate meter reading and over estimation from bulk meters. The similarities of these findings further support the outcome from the survey in relation to complaints on water bills issues.

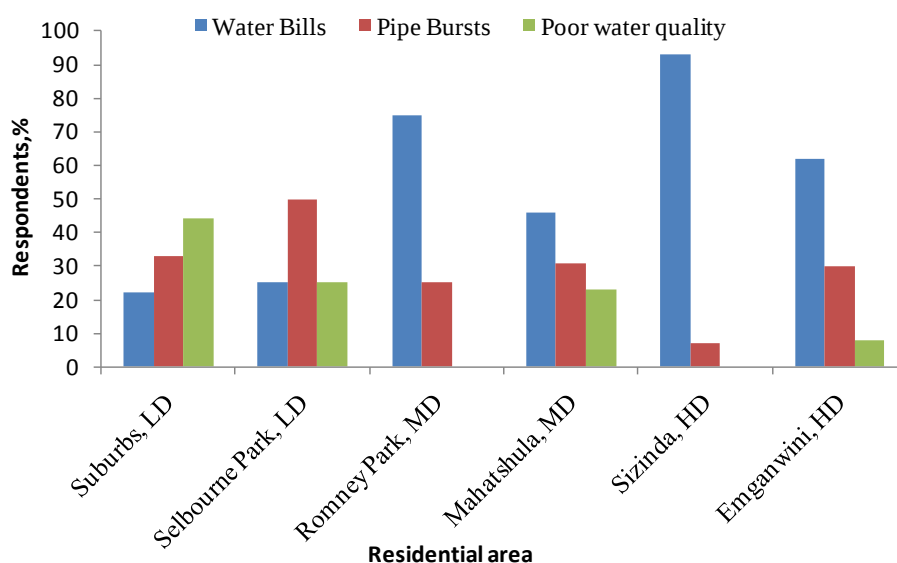


Figure 4. 10: Household survey results on nature of consumers' complaints to BCC, April 2011

The types of complaints mentioned by consumers during the survey were similar to those mentioned by key informants as being received from consumers, with the complaints of issues relating to water bills topping the list as seen in Fig. 4.10. The exact number of complaints per year could not be established but key informants

from BCC confirmed that the frequency of the three common complaints has since increased from the USD\$ period in 2009. BCC gives priority to complaints regarding water bursts and leaks. A record of the number of leaks and burst pipes attended to per annum by BCC reflects more on operation and maintenance indicator, as shown in Table 4.8.

Table 4. 8: Burst pipes and new connections that were reported and attended to in 2002, 2006 and 2010

<i>Incidents</i>	<i>2002</i>	<i>2006</i>	<i>2010</i>
Burst pipes	890	234	378
Service connections, valves and fire hydrants	5,845	1,328	3,262
New water connections	4,257	133	672
Total	10,992	1,695	4,312

Source: Engineering Services Report for 2010

Complaints are relatively easy to track but they do not tell us much about the performance of a utility on customer relations. Customers may have become accustomed to poor service and do not complain. In other instances it may be difficult for customers to report complaints depending on the means and channels of communication flow between the residents and council. For these reasons, it is sometimes difficult to derive any meaning from the number of complaints indicator (Tynan and Kingdom, 2002; Castro and Mugabi, 2009). A very low number of complaints might indicate a utility not in touch with its customers, where relatively little interaction occurs between the utility and its customers. The other extreme is very high levels of complaints where there is dissatisfaction and customers are expressing it. Between these extremes lies an acceptable level of interaction where customers are generally satisfied but the realities of not being able to keep everyone happy, continues to generate interactions.

Continuity of Supply

Continuity of supply is defined in terms of the average hours of service a day. This indicator was difficult to establish as consumers cited a lack of forewarning and explanation prior to water cuts from BCC. There was general dissatisfaction amongst

respondents with the water supply delivery system in the City of Bulawayo and their major concern was with the numerous and frequent burst pipes which they felt were not being attended to promptly hence affecting the continuity of supply. Figure 4.11 shows responses from the each residential area regarding consumers' perceptions on performance of water services provision provided by BCC. About 55% of consumers from all residential areas confirmed that while service delivery from BCC had deteriorated, they at least could guarantee supply of piped water within 24 hours and rated a fair performance of BCC under the existing circumstances.

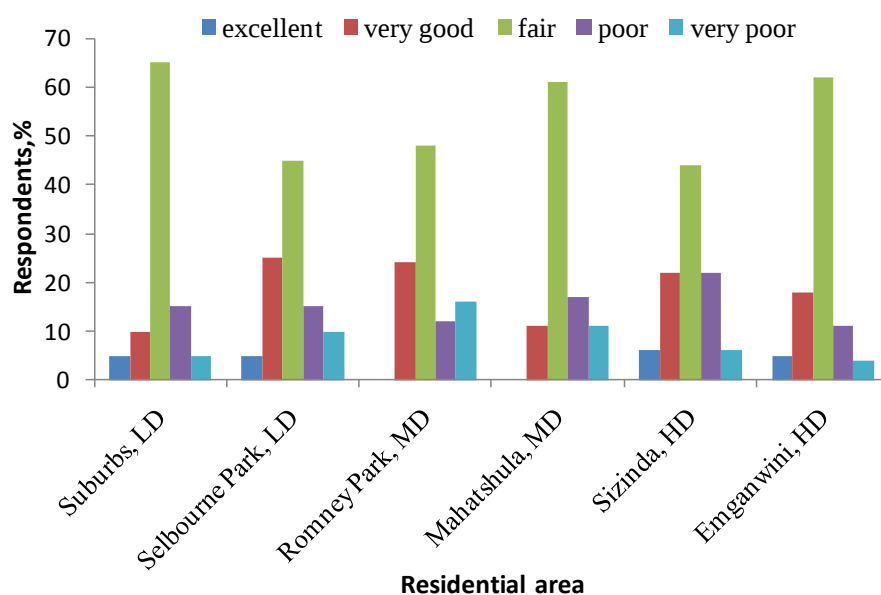


Figure 4. 11: Household survey results on consumers' perception on performance of water services provided by BCC, April 2011

Continuity of supply is an important customer indicator because being connected to the network does not necessarily mean a customer is receiving good quality water when they need it. Inefficiencies resulting from the poor state of repair of water infrastructure, institutional weaknesses and a lack of financial viability, often make it difficult to have potable water flowing continuously in the pipes.

Water quality

Figure 4.12 shows the responses from consumers regarding the quality of drinking water supplied by BCC. In the low density area of Suburbs, 95% of respondents perceived that the water provided by BCC was not purified and was not fit for human consumption. About 50% of respondents in Selbourne Park stated that the water was coloured, with the remaining 45% stating that the water is simply not purified. In the

medium and high density suburbs, 65% of respondents confirmed their dissatisfaction with the most common response stating that the water is not purified at all. This means residents had perceived all the possible combinations of negative description of the water from odour, colour, taste and particles with the remaining percentage just simply emphasising one dominant negative property. For example in Emganwini high density suburb one respondent stated that;

“If the water is collected in a container a layer of sediments settles at the bottom and cloudy water remains, this has compelled us to boil the water to make it safe for drinking.”

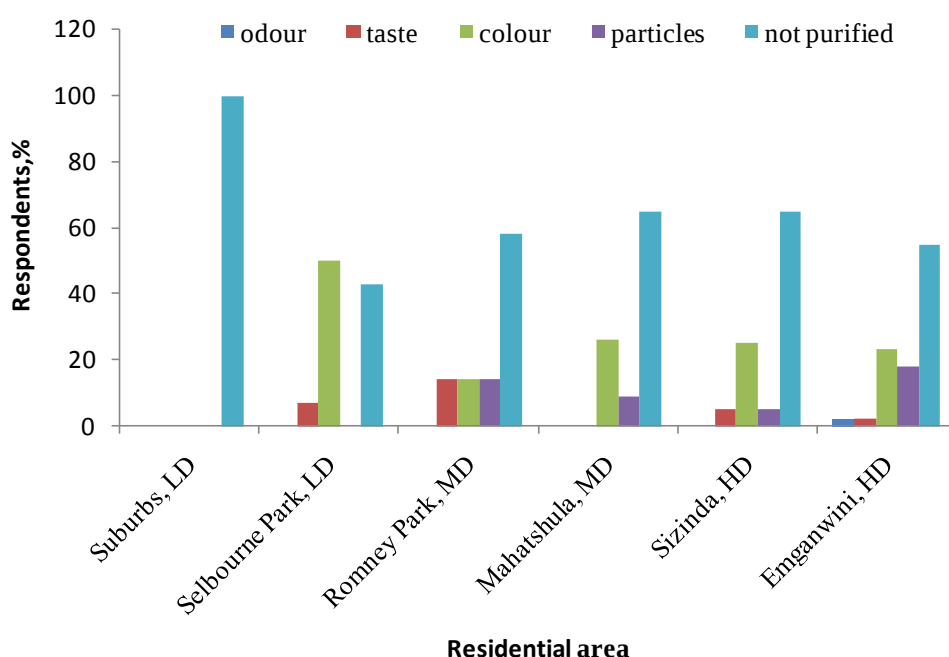


Figure 4. 12: Household survey results on consumers' perceptions on drinking water quality provided by BCC, April 2011

During the household survey it was observed that if drinking water from a piped source is not clear consumers generally perceive that it is not fit for human consumption as supported by Carter (1996) who states that water sources may be rejected because of unpleasant but not harmful, aesthetic water quality parameters such as colour, taste and odour. According to WUP (2005) water should be free of taste and odour that would be objectionable to the majority of consumers.

Water pressure

Figure 4.13 shows household survey results on consumers' perceptions regarding the pressure of piped water provided by BCC. Frequency of responses are given for each

suburb and consumers indicated high, average and low pressure with some confirming that they did not know. About 70% of all respondents in all residential areas confirmed that the pressure of the piped water was normal, though some respondents did confirm frequent burst pipes and repairs interfered with the pressure of the piped water as low pressure was evident at the return of water after water cuts.

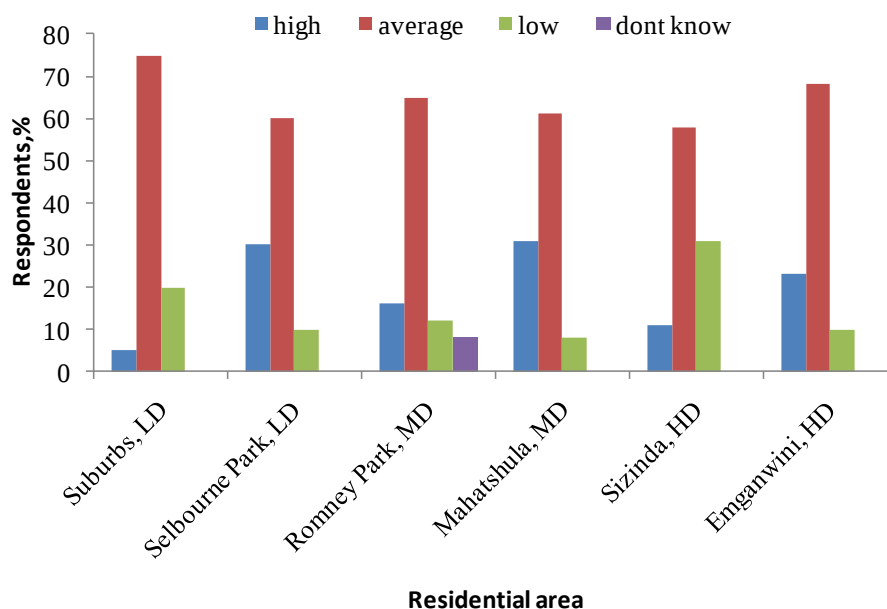


Figure 4. 13: Household survey results on consumers' perceptions on pressure of piped water provided by BCC, April 2011

4.3.2 Conclusion

Table 4.9 shows the results of the public perception indicators according to the conceptual framework developed. The results shown are from the household survey carried out in April 2011. The figures show indicators that are below expected best practice targets. The cost of obtaining a new connection was found to be on estimate 60 % of average household income above the target of 20 %. In terms of cost of water indicator about 35 % of the respondents' judgement as affordable, this is below the 75 % target. Water quality indicator scored 5% of consumer satisfaction while the water pressure was 70 % of consumer satisfaction. Response to customer complaints indicator reflects the average response time to respond to major pipe bursts around the city and not the actual customer complaints as expected. The other nature of complaints like water bills and water quality issues are dealt with individually if consumers directly approach council premises.

Table 4. 9: Conceptual framework results on objective 3 for 2010

<i>Public perception indicator</i>	<i>Description</i>	<i>Target</i>	<i>Results</i>
Cost of obtaining a new connection	Percentage of average household income	< 20 %	60 %
Cost of water	Percentage of consumer judgement as affordable	> 75 %	35 %
Water availability	Hours of service per day	24 hrs	*24 hrs
Response to customer complaints	Average response time	< 3 days	3 dys
Water quality	Percentage of consumer satisfaction	100 %	5 %
Water pressure	Percentage of consumer satisfaction	100 %	70 %

** Water availability is subject to irregular frequent water shedding, recurrent bursts pipes and unannounced water cuts*

Consumers of services provided by public organizations have come to demand services of better quality. This is supported by Osborne and Gaebler (1992) who state that ‘...people today expect to be valued as customers, even by government service providers.’ They further explain that the improved levels of education of the consumers explain part of this shift whereby increasingly well educated and demanding citizens were less prepared to accept poor service from public officials. Barzelay (1992) argues that the most important conceptual challenge to the bureaucratic paradigm arising in the world of practice is the notion that government organizations should be customer driven and service oriented. BCC therefore needs to strengthen its focus on consumers so that it becomes customer-oriented service driven.

4.4 Summary

The performance assessment was carried out using existing theories in relation to four broad performance categories. Benchmark indicators, depending on availability of data, are derived from these categories to give a quick review of the performance of a utility (Tynan and Kingdom, 2002). Table 4.10 gives a quick review of the performance of BCC from which one can deduce whether BCC utility is performing

well or not. The indicators in Table 4.10 reflect progress on performance over the years as shown by the number of connections that have increased with increasing population. Other indicators like UfW and collection ratio show fluctuations over the years which make it difficult to interpret performance without considering external and internal factors influencing the indicated levels of performance.

Table 4. 10: Benchmark performance indicators for the study

<i>Indicator</i>	<i>Target</i>	<i>2002</i>	<i>2006</i>	<i>2010</i>
Population served	-	676,650	706,920	738,540
Water Supply connections	-	106,050	112,427	152,806
No. of employees	750	1,301	1,497	678
UfW	20%	18%	54%	35%
Working ratio(1/OCCR)	<1	4.2	2.08	1.67
Staff per 1,000 connections	<5	12	13	4.43
Collection ratio	73%	42%	77%	35%
Average domestic tariff (USD\$/m ³)	0.76	0.37	0.06	1.08
Overall Efficiency Indicator	66%	37.8%	35.4%	22.7%

Mwanza (2004) and Castro and Mugabi (2009) cite the following limitations when making conclusions on benchmark indicators of utilities:

- Indicators tend to portray an incomplete picture of a utility's performance as they often exclude other contributing factors such as accountability of institutions and incentives that are not readily quantifiable.
- Analysis of data of a single year provides only a snapshot of performance.
- Indicators not to be interpreted rigidly as utilities face different social, political and financial constraints.

Taking the limitations into consideration the results of the study in Table 4.10 are inconclusive. The non-availability of data from 2007 to 2009 has made it difficult to come up with the latest trends on the performance of BCC. However, among some of the prevailing factors influencing current performance is the 'dollarization era' of which it is uncertain how long it will exist..

5. CONCLUSIONS AND RECOMMENDATIONS

From the objectives and results of this study, the following conclusions and recommendations were made:

Objective 1	To determine operational performance indicators of BCC.
Observations	There is suppressed demand due to dormant manufacturing industry which is still trying to recover from the macroeconomic challenges. Service delivery was mainly being affected by high staff turnover in the recent past.
Conclusion	The target performance levels were below best practices targets.
Recommendations	Further studies are required to link perceptions and technical information on the ground.
Objective 2	To determine financial performance indicators of BCC.
Observations	The utility has experienced low revenue collection efficiency and revenue owed by bad debtors and high inflation rates in the past. High levels of UfW and revenues in arrears owed by bad debtors have a negative impact on the financial sustainability.
Conclusion	The performance levels that were obtained in this study were below the standard best practices recommended for developing countries.
Recommendations	BCC should close the gap between costs and revenues through public awareness campaigns to encourage people to pay for services provided.
Objective 3	To assess consumers' perceptions on performance of BCC.
Observations	Consumers have a negative perception towards BCC arising from the perceived lack of response to burst water pipes, the lack of forewarning and explanation for water cuts and the perceived high current cost of water. Water conservation is firmly entrenched in

consumers, with respondents indicating that they practice water conservation measures, despite the lifting of water rationing. Consumers rate an overall fair performance on BCC.

Conclusion About 60% of consumers in Bulawayo generally have a negative perception of service delivery.

Recommendations There is need to establish a regulatory board to protect consumers interests and monitor performance of water services.
Further studies should include industry, commerce and institutions in addition to domestic consumers.

REFERENCES

- Asia Development Bank, ADB. (1997), *Second Water Utilities Data Book: Asia and Pacific Region*, A.C. Macintosh and C. E. Yniguez Edition, ADB, Manila.
- Baietti, A., Kingdom, W. and Ginnekem, M. (2006), “Characteristics of well performing public water utilities.”: Water supply and Sanitation working notes www.siteresources.worldbank.org/INTWSS/Resources/workingnote9.pdf (Accessed November, 2010).
- Bov’ee, C.L. and Thill, J.V. (1992), “*Business Communication Today*”, 3rd Edition, McGraw-Hill, USA.
- Barzelay, M. (1992), *Breaking Through Bureaucracy: A New Vision for Managing in Government*, Berkeley: University of California Press.
- Bulawayo Encyclopædia Britannica. (2010), *Encyclopaedia Britannica Ultimate Reference Suite*. Chicago: Encyclopædia Britannica.
- Bulawayo City Council (BCC) (2000), *Annual Water Report*, Bulawayo, Zimbabwe.
- Bulawayo City Council (BCC) (2001), *Annual Water Report*, Bulawayo, Zimbabwe.
- Bulawayo City Council, (BCC) (2002), *Annual Water Report*, Bulawayo, Zimbabwe.
- Bulawayo City Council, (BCC) (2003), *Annual Water Report*, Bulawayo, Zimbabwe.
- Bulawayo City Council, (BCC) (2004), *Annual Water Report*, Bulawayo, Zimbabwe.
- Bulawayo City Council, (BCC) (2005), *Annual Water Report*, Bulawayo, Zimbabwe.
- Bulawayo City Council, (BCC) (2006), *Annual Water Report*, Bulawayo, Zimbabwe.
- Bulawayo City Council, (BCC) (2010), *Annual Water Report*, (Unpublished).
- Castro, V. and Mugabi, J. (2009), *Water Operations Partnerships - Africa Utility Performance Assessment*. Final Report, Global WOP Alliance.
- Chinyama, A., Gumbo, B. and Hoko, Z. (2007), *Assessment of Metering and Billing as Water Demand Management Measures: A Case Study of the City of Bulawayo*, MIWRM Thesis, University of Zimbabwe.
- Chioreso, R., Mabiza, C.C. and Manzungu, E. (2008), *Impacts of water scarcity on households in Harare, Zimbabwe*, MIWRM Thesis, University of Zimbabwe.
- Creswell, J. W. (2000), *Research Design: Qualitative and Quantitative Approaches* (2nd Edition) Thousand Oaks: Sage Publications.
- Depoy, E. and Gitlin, L.N. (2005), *Introduction to Research: Understanding and Applying Multiple Strategies* (3rd edition). St. Louis Missouri 63146: Elsevier Mosby.
- Franceys, R.W. (2001), *Financial Management and Marketing*. Unpublished Lecture Notes. IHE. Delft, The Netherlands.
- Gentry, B. and Fernandez, L. (1997), ‘*Evolving Public-Private Partnerships: General Themes and Urban Water Examples*’, OECD Workshop on

- Globalization and the Environment: New Challenges for the Public and Private Sectors, November 13 and 14 1997, pp. 19-25 Paris: OECD.
- Ghebremichael, K. (2010), *Water Supply and Sanitation*, Unpublished Lecture Notes. UNESCO-IHE, Polytechnic of Namibia.
- Government of Zimbabwe (2002), *Central Statistical Office Census Report Bulawayo Province*, Printflow, Harare, Zimbabwe
- Haarmeyer, D. and Mody, A. (1997), *Worldwide Water in Privatisation: Managing Risks in Water and Sanitation*, London: Financial Times Energy.
- Harvey, N. (2002), *“Effective Communication”*, Gill and MacMillan Limited, Dublin.
- Hughes, O. (2003), *Public Management and Administration: An Introduction*, third edition, New York: Palgrave MacMillan.
- Idelovitch, E. and Ringskog, K. (2000), *Private Sector Participation in Water Supply and Sanitation in Latin America*, Washington D.C.: World Bank.
- International Benchmarking Network for Water and Sanitation, IBNET, (2006), *Non-Revenue Water at the International Benchmarking Network for Water and Sanitation Utilities.*, Water 21, Journal of IWA, p30.
- International Water Association, IWA. (2003), *Assessing Non-Revenue Water and its Components - A Practical Approach*, (Accessed February 2011)
- Kimey, V., Hoko, Z. and Mashauri, D. (2008), *Assessment of the performance of urban water supply utilities: A case study of Korogwe and Muhezwa towns, Tanzania*, MIWRM Thesis, University of Zimbabwe.
- Kitundu, K. J. (2006), *“Stakeholders’ involvement – New Models of participation in Tanzania (The experience of Mwaloni market environmental improvement project in Mwanza city council)”*, Municipal economist, Mwanza city council, Tanzania.
www.tanzaniagateway.org/.../stakeholderinvolvement_newparticipationmodeisinTanzania.pdf, (Accessed March 2011)
- Manzungu, E. (2008), *Towards a New Water Creed: Water Management, Governance and Livelihood in Southern Africa*, Weaver Press, Avondale, Harare
- Manzungu, E. and Machiridza, R. (2005), *An Analysis of Water Consumption and Prospects for Implementing Water Demand Management at Household Level in the City of Harare, Zimbabwe*. Physics and Chemistry of the Earth, 30: 925-934
- McIntosh, A. C. (2003), *Asian Water Supplies: Reaching the Urban Poor, Chapter 9: Non-Revenue Water*, Asian Development Bank:
[\[http://www.adb.org/Documents/Books/Asian_Water_Supplies/chapter09.pdf\]](http://www.adb.org/Documents/Books/Asian_Water_Supplies/chapter09.pdf) (Accessed July 2011)
- Msuku A., Kimwaga R. and Mashauri D. (2010), *Assessment of Public Water Utilities’ Performance in Malawi: Case of Blantyre, Lilongwe and Northern Region Water Boards*, MIWRM Thesis, University of Dar es Salaam.
- Mugabi, J., Kayaga, S. and Njiru, C. (2006), *Strategic Planning for Water Utilities in Developing Countries*. Utility Policy, Volume 15, Issue 1.
www.sciencedirect.com/science (Accessed February 2011).
- Muhairwe, W.T. (2010), *Making Public Enterprises Work*, Paper presented at the 11th Waternet/WARFSA/GWP-SA Symposium held in Victoria Falls, Zimbabwe 27-29 Oct.2010

- Mwanza, D. (2004), *African Public Utilities Not Performing Efficiently*, Paper presented at the 12th Union for African Water Suppliers Congress, 16 to 19 February, 2004 in Accra, Ghana.
- Mwanza, D. (2005), *Promoting Good Governance through Regulatory Frameworks in African Utilities*, Water Science and Technology, Vol 51 No. 8, London: IWA Publishing, pp. 71-79
- Mwanza, D. (2006), *Benchmarking of Utilities for Performance Improvement*. Water and Sanitation Program, WSP (8th December 2006)
- Nickson, A. (2002), *The Role of the 'Non-State Sector in Urban Water Supply*, Paper for the 'Making Services Work for Poor People' World Development (WDR) 2003/04
- NORPLAN, A.S., (2005), *Water Use, Water Conservation and Affordability Report*; Implementation of the Bulawayo Water Conservation and Sector Services Upgrading Project. Submitted to Bulawayo City Council.
- NORPLAN, A.S., (2001), *Bulawayo Water Conservation and Sector Services Upgrading Project Final Report, Vol. 1* Submitted to Bulawayo City Council.
- OFWAT, (2007), *International Comparison of Water and Sewerage Service: 2004-05*, Office of Water Services, Birmingham (April, 2007).
- Orodho, (2003), *Essentials of Education and Social Science Research Method*. Nairobi Masola Publisher
- Osborne, D. and Gaebler, T. (1992), *Reinventing Government: How the Entrepreneurial Spirit is Transforming the Public Sector*, Reading: Addison-Wesley.
- Panayotou, T. (1997), 'The Role of the Private Sector in Sustainable Infrastructure Government Working Together for a Better Environment', Yale School of Forestry and Development', In: Gomez-Echeverri, L. (ed.), *Bridges to Sustainability: Business and Environmental Studies Bulletin Series 101*, New Haven: Yale University.
- Polit, D. and Hungler, B. (1998), *Nursing Research: Principles and Methods*. Lippincott: Williams Wilkies.
- Pollit, C. (2003), *The Essential Public Manager*, Maidenhead: Open University Press.
- Sammy, W. (2004), "Water privatisation in Kenya: Global issues papers No. 8", www.boell.de/downloads/internationalepolitik/GIP8.pdf (Accessed March 2011)
- Sanchez, A. (2006), Examples of Qualitative Research methods. Available at: <http://e-articles.info/e/a/title/EXAMPLES-OF-QUALITATIVE-RESEARCH/> (Accessed November 2010)
- Schouten, M., Hes, E. and Hoko, Z., (2009), 'Innovative Practices of African Water Providers', Published by Sun Media Publishing. South Africa.
- Schwartz, K. (2005), *Politics and Water Services: The Need for a Political Approach to Water Services Management*, Paper presented at the AGUA 2005 Conference held in Cali, Colombia 31 October – 4 November 2005.
- Spiller, P. and Savedoff, W. (1999), 'Government Opportunism and the Provision of Water', In: Spiller, P. and W. Savedoff (eds.), *Spilled Water: Institutional Commitment in the Provision of Water Services*, Washington D.C.: Inter-American Development Bank.
- Tynan, N. and Kingdom, W. (2002), A water scorecard: Setting Performance Targets for Water Utilities. *Public Policy for the Private Sector*, Note No. 242, World Bank

- United Nations Development Programme, (2006), *Beyond scarcity: power, poverty and global water crisis*. Human development report, 2006, New York: United Nations Development Programme
- UNICEF-AusAID. (2009), *Assessment of water and sanitation systems in Zimbabwe*, Assessment Report submitted to Bulawayo City Council.
- UnitedCitiesandLocalGovernments;www.cities-localgovernments.org/gold/Upload/Country_profile/Zimbabwe.pdf, (Accessed April 2011)
- Wolff, G. and Gleick, P. (2002), *The soft path for water*. In: Gleick, P. (editor). *The world's water: 2002-2003*. Washington DC: Island Press
- Workshop, 4-5 November in Oxford.
- Wright, A. (1997), *Toward a Strategic Sanitation Approach: Improving the Sustainability of Urban Sanitation in Developing Countries*, Washington D.C: World Bank.
- WHO-UNICEF. (2001), *Joint Monitoring for Water Supply and Sanitation*. Global Water Supply and Sanitation Assessment, Geneva and New York.
- World Health Organisation, WHO. (2004), *Guidelines for drinking water quality*, Third Edition. Volume 1. Recommendations, Geneva, Switzerland.
- World Health Organisation, WHO. (2002), *Water Supply and Sanitation Sector Report, 2000*. Africa Regional Assessment.
- World Health Organisation, WHO. (2000), *Tools for assessing the Operation and Maintenance status of water supply and sanitation in developing countries: Tool 7; Performance indicators for water supply and sanitation*. Geneva, Switzerland.
- Yerpes, G. and Dianderras, A. (1996), *Water and Wastewater Utilities Indicators*, 2nd Edition. World Bank, Washington D.C., USA.
- Yniguez, C.E. (2009), "Phillipines Small Towns water utilities performance: World Bank waterweek", www.siteresources.worldbank.org/.../8.2_Philippines_benchmarking_study_Yniguez.pdf (Accessed March 2011)
- Ziria, N. A. (2008), "Local revenue generation: Uganda experience", www.ansa-africa.net/.../uganda_revenue_generation_Ziria (Accessed May2010)
- Zinyama, L. (1995), 'The evolution of the spatial structure of the greater Harare.' 1890 to 1990 in Zinyama, L. M, Tevera, D. S. And Cumming (eds) 1995, *Harare: the growth and problems of the city*. University of Zimbabwe Publications, Harare

Appendices

A1. Key Informant Interview Guideline

Name of Respondent:

Position:

Date:

(A) General Information

1. When did the authority start? (History of authority)
2. Briefly explain the structure of the organisation and their functions.
3. What is your current number of customers?
4. What kind of people in the community do you target?

(B) Water Supply

5. What are the sources of water for your production?
6. What is the current production of water per day?
7. What is the current percentage of production v/s demand in water supply?
8. What is the percentage estimation of UfW per day?
9. What is the total number of customers that have been connected in the system?
10. How many out of them have been metered?
11. How many community stand pipes do you have?
12. How many are working?
13. Which month in the year do you have critical water shortage?
14. What are the main causes of this water shortage?
15. What is the unit operational cost of production?
16. What is the average water tariff for different users?
17. What are the total revenues collected per year?
18. What is the collection period of tariffs from consumers?
19. What is the labour cost as proportion of operational cost?

20. How do you rate your performance as a water supply utility?

(C) Customer Service Provision

21. What are the ways in which customers can get access to the utility? (phone, in person, internet etc.)

22. To what extent are customers involved in decision making to the utility? (customer council, suggestion boxes, etc.)

23. What is the nature of complaints over the past years? (poor services, pipe burst, water shortage, poor water quality etc.)

24. How do you resolve the customer's problems? Or how does the authority use the information generated by the complaints?

25. Has the nature of complaints changed over the years?

26. How do you cater for the urban poor?

(D) External Factors

27. What are the existing roadblocks (regulatory, institutional, structural etc.) in water supply provision?

28. How do these roadblocks affect your organisation's action related to the customer relation?

29. What marketing strategies do you have for your services?

30. What procedure is used to establish tariffs?

31. In your opinion, what problems do you see when you look at the management of your water provision? What do you think should be done?

A2. Household Questionnaire Guideline

GENERAL INFORMATION

Enumerator's Name:.....

Name of Respondent:.....

Name of Suburb:.....

House Address:.....

Date:..... Start Time:..... Finish Time:.....

Please respond by ticking one answer to each relevant question. For each of 1b) and 1c) indicate the number of females and males respectively.

Section A: Accessibility of Water

1. Demographic and Socio-economic status of household

a)No. of people within the household	b)No. of adults	c)No. of children	d)Collective Income	e)Income generating activities carried out at households
☐ Less than 5	☐ females	☐ females	☐ US\$180>	☐ Selling vegetables
☐ 5-10	☐ males	☐ males	☐ US\$180-US\$900	☐ Home salons
☐ 11-15			☐ US\$900<	☐ Home industry
☐ other specify				☐ Commodity trading
				☐ Formally employed
				☐ other specify.....

2. Please indicate type of house

☐ Semi-detached ☐ Flat ☐ shack

☐ Bungalows ☐ Mansionette ☐

other.....

3. What is the main water source used by the household?

☐ Piped water ☐ water vendor ☐ River/pond

☐ well/borehole ☐ tanker truck ☐

other.....

4. If it is piped, where is the source connected?

☐ In own house ☐ In own yard/plot ☐ In neighbours house

☐ communal kiosk ☐ other.....

5. In a situation where piped water is not available, what is your alternative source?

☐ Public kiosk ☐ neighbouring house ☐ pond/river

☐ water vendors ☐ well/borehole ☐

other.....

6. If well/borehole who is the owner?

☐ district council ☐ community ☐ private

☐ other.....

7. On average how frequently do you receive piped water?

☐ once a day ☐ twice a day ☐ once a week

☐ continuous 24hr supply ☐ every alternate day ☐

other.....

8. Do you experience seasonal water shortages in each year? Yes ☐ No ☐

9. If yes, which months in the year?

☐ Dec - March ☐ March – June

☐ June – Sept ☐ Sept – Dec

Section B: Affordability and Reliability

10. What is the average water consumption per day for the household use?(sample using a bucket to estimate consumption)

☐ 30- 50litres ☐ 50-100litres ☐ 100-150litres

☐ 150 – 200litres ☐ other.....

11. Is your piped water metered? Yes ☐ No ☐
12. If yes, how much do you pay per cubic meter/unit of water?
13. If no, how much do you pay per month? daily?
14. In your opinion how do you perceive water price?
☐ high ☐ fair ☐ low ☐ other.....
15. Do you afford to pay for water services? Yes ☐ No ☐
16. Have you ever experienced a situation where you could not afford to pay water bills in the past 12months? Yes ☐ No ☐
17. If yes, give reason(s).....
18. In your own opinion, do you think water services have improved in the past three years? Yes ☐ No ☐

Section C: Sufficiency and Effectiveness

19. Do you receive your water bill in time every month? Yes ☐ No ☐
20. If no, how long does it take to receive your water bill?
☐ 1-2months ☐ 2-4months ☐ 4-6months
☐ >6months ☐ other.....
21. Have you ever made any complaint to the authority about water services?
Yes ☐ No ☐
22. If yes, what type of complaint?
☐ water bills ☐ Pipe Burst ☐ poor water quality
☐ other specify.....
23. Was your complaint handled? Yes ☐ No ☐
24. If yes, were you satisfied with the way your complaint was handled?
Yes ☐ No ☐
25. Does the BCC supply good water for drinking? Yes ☐ No ☐
26. If no, please state why?
☐ odour ☐ taste ☐ coloured ☐ particles ☐
other.....

27. When piped water is available how do you rate the water pressure?

☐ high ☐ average ☐ low ☐ don't know ☐ other.....

28. In your opinion, do you think BCC is providing good services? Yes ☐ No ☐

29. What do you perceive as major problems in relation to water services provision?

☐ cost of water ☐ water shortage ☐ customer services

☐ water losses ☐ other.....

30. How would you describe the level of information you have about BCC water supply services?

☐ very well informed ☐ well informed ☐ not at all informed

☐ don't know ☐ other.....

31. In your opinion what do you think should be done by BCC to improve the water service provision?

.....

.....

.....

.....

.....

.....

32. Performance Evaluation of Service Provision

	Billing Accuracy	Value for money	Promptness in repairing burst pipes	Supply efficiency	Performance of service provision
i)Excellent					
ii)very good					
iii)fair					
iv)poor					
v)Very poor					

Please respond by ticking one comment for each column.

vi)Other specify.....

A3. Research Agreement

TC PERS
CITY OF BULAWAYO
MEMORANDUM OF AGREEMENT FOR RESEARCH STUDENTS

MEMORANDUM OF AGREEMENT made between the City Council of Bulawayo (hereinafter referred to as the Council) of the one part and Mr/Mrs/Miss BELINDAH NCUBE (full names) hereinafter referred to as the "researcher" of the other part.

This agreement witnesseth that:

1. The Researcher agrees not to divulge any information which he/she gains as a result of his/her research at Council department/s.
2. The Researcher agrees to indemnify the Council against any injury that may occur to her/him as a result of the research with the Council.
3. The Researcher will submit a copy of his/her findings, including the Executive Summary, on completion of the project, to the Council.
4. The Researcher agrees that all costs relating to the research project, will be met by her/him and Council has no obligation in this regard.

Signed at Bulawayo on behalf of the Council this 31 day of 01 2011.

As Witness

1. [Signature]
2. [Signature]

Signed at Bulawayo by the Researcher this 31 day of 01 2011.

As Witness:

1. [Signature]
2. [Signature]

[Signature]
Council Official
[Stamp]
31
CITY OF BULAWAYO
01 FEB 2011
RESEARCHING STUDENTS DEPARTMENT
[Signature]
Researcher