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Service quality gap analysis to improve public water service delivery in Lilongwe city: tapping customer's voice

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Abstract

For a long time, high urbanisation rate, poor revenue collection, high levels of non- revenue water coupled with erratic rainfall have been affecting water supply services in Malawi's capital, Lilongwe city. Even though efforts have been put on supplying potable water to the majority of the residents, water intermittence still remains a common characteristic in the city. Information on how water is delivered and whether its supply meets customer expectation has not been explored. Therefore, a water SERVQUAL model was used to identify specific areas in which customers' expectations were not being met and provide information on customers' needs to enable public water utility supplier to improve its services. A total of 266 customers were sampled from Southern, Central and Northern water supply zones of the city. The results indicated that customer expectations are not met as there are negative gap scores for all service quality dimensions. Overall, results indicated that central zone had the widest gap score of -2.76 followed by -2.50 for northern and -2.18 southern zone. The service quality dimensions such as reliability, responsiveness assurance and tangibles had the widest gap even though they were viewed as very important by customers. There is a need for the Lilongwe Water Board to improve its service delivery by focusing on the dimensions that have the widest gap while taking into account those with nearest gap scores for sustainable water supply.

Keywords: SERVQUAL, Lilongwe Water Board (LWB), water service quality delivery, expectation, perception

1.0 Introduction

Most public water utilities in developing countries are faced with a number of challenges in improving service quality delivery. These challenges are linked to infrastructural, financial, environmental and health, social-political and managerial (OJO 2011). For over the past two decades, more efforts have been made on improving sustainable water supply by many countries. This has been made possible through the assessment of the performance of the public water utilities (Tiwari & Gulati 2011; Zschille & Walter 2012; Kalulu & Hoko 2010) and examination of the impact of public or private ownership on the performance of the water utilities (Kirkpatrick et al. 2004; Kirkpatrick et al. 2006). More studies have also focused on assessing the level of customer satisfaction with the service delivery (Jayaramu et al. 2014; Zeraebruk et al. 2014) in order to provide reliable information to policy makers. However, most of these studies have not assessed the service quality gap between customer(s) expectation and perception with the water service delivery. This demonstrates that the quality of water service delivery and the satisfaction level of customers are not considered as relevant performance dimensions for water utilities (Mukokoma & van Dijk 2011). OJO, (2011) had asserted that customers' expectations act as the bottom line on which service quality delivery is evaluated by customers.

Like in other countries, access to potable water in Malawi cities is a very big challenge and nearly 50% of all illnesses recorded in the country are related to water-borne diseases (Manda 2009; Mughogho & Kosamu 2012). The access to water is affected by unreliable and intermittent water supply due to deterioration of water infrastructure (Mughogho & Kosamu 2012), poor revenue collection by the utility providers (Manda 2009; Kalulu & Hoko 2010), high levels of unaccounted water (Non-Revenue Water) (Harawa et al. 2016) and rising urban population (Mpakati-Gama & Mkandawire 2015). According to Mpakati-Gama & Mkandawire (2015), the rising population exerts pressure on water distribution systems and structures originally constructed for smaller populations. For instance, in Lilongwe city (Malawi's capital), high urbanisation has not been fully tackled by the Lilongwe Water Board (LWB), the city's sole potable water supplier. This has forced LWB to rationally supply water in all three major water supply zones of the city.

Despite severe urban water issues prevalent in Lilongwe city, some of which were reported by Manda (2009); UN-HABITAT (2011); LCC (2013), no attention has been given to understand how the water is delivered to customers, their expectation and perception and performance gap analysis tapping customer's voice. Therefore, this study employed the water SERVQUAL model to collect systematic data on the service expectations and perceptions for the assessment of the urban water service delivery quality. The model was useful in identifying specific areas in which customers' expectations are not being met and providing information on customers' needs to enable the LWB to improve its services accordingly.

1.1 SERVIQUAL model literature review

For a long time, provision of public services had been inefficient. As a result, a number of initiatives (since 1985) have emerged with a common goal to improve service quality delivery. The milestone was reached when Parasuraman et al. (1985) developed SERVQUAL model for service quality gap analysis. The model was later revised and presented in an improved form in 1988 (Parasuraman et al. 1988) and 1991 (Parasuraman et al. 1991). The SERVQUAL model is popularly used to assess the quality of service provision in terms of what consumers expect and what they actually receive (Brysland & Curry 2001). It defines five dimensional attributes (table1) that customers consider when assessing the delivery of the service. The model is useful in identifying specific areas in which customers' expectations were not being met and to provide information on the customers' needs to enable service providers to improve their service accordingly (Ching 2004; OJO 2011; Mukokoma & van Dijk 2011).

Table 1. Water Service Quality model (WASERVQUAL).

Dimensions	Description	Indicators
Reliability	Ability to perform the service dependably and accurately	*Living to the promises made *Showing sincere interest in solving customer's problems *Providing water at the promised time *Ensuring billing accuracy *Ensuring few water interruptions
Tangible (service environment)	Appearance of physical facilities, equipment, personnel and communication materials	*Having up-to-date equipment * Having visibly appealing facilities *Having water pipes that are well maintained. *Having employees that are well dressed and appear neat
Responsiveness	Willingness to help customers and provide prompt services	*Identifying customer's needs *Having customers' interests at heart *Prompt handling of complaints
Assurance	Knowledge and courtesy of the employees and their ability to convey trust and confidence.	*Customers trusting employees *Customers considering water to be safe *Employees being polite *Employees having knowledge to address customer's questions
Empathy	Caring, individualized attention provided to customer.	*Timely information on likely water disconnection *Adequate time given for water bill clearance *Length of queues while clearing water bills *Willingness of employees to help

Source: (Mukokoma & van Dijk 2011)

1.1.2 SERVIQUAL model application

SERVQUAL model is a tried and tested instrument which is comparatively used in service quality research. The tool has been applied in different sectors such as education (Li et al. 2011; Asogwa Brendan et al. 2014), health

(Peprah & Atarah 2014), airlines (Chou et al. 2011) and banking (Ilyas et al. 2013; Gajah et al. 2013; Kumar et al. 2010; Aghdaie & Faghani 2012), tourism (Kouthouris et al. 2005; Ho et al. 2013) and agriculture (James et al. 2012). Notably, a few studies have applied the model in the water sector (Lee, 2004; Mukokoma & van Dijk, 2011; OJO, 2011).This demonstrated how important the tool is in the service quality research. Its use allows investigation of the performance of the firm on the services it delivers (Mukokoma and Van Dijk, 2011). It performs a gap analysis of organisations' service quality needs by assessing the gap between what the customers expect and their evaluations of the performance of a particular service provider (OJO 2011).

1.1.3 Measuring service quality-The SERVQUAL instrument

Measuring service quality is a key management activity as it provides information necessary for monitoring performance and for allocating resources (Lee, 2004). Parasuraman et al. (1988) stressed that service quality is measured by comparing customers' expectations of the service with their perceptions of the actual service delivered by a particular service provider. Service quality measurement is based on the assumption that the gap is determined by computing the difference between customer's expectations of a service and the customer's perceptions of an actual service delivered by a service provider. According to Lee (2004), customers' expectations and perceptions are determined by word-of-mouth communications, the personal needs of the customers and the past experience of the customers. Initially, Parasuraman et al. (1985) presented ten dimensions for measuring service quality; tangibles, reliability, responsiveness, competence, courtesy, credibility, security, access, communication and understanding the customer. These dimensions were later grouped into five major SERVQUAL dimensions (Parasuraman et al. 1988) for effective service delivery performance assessment as shown in table 1. The theoretical model for measuring service quality gap is shown in figure 1 below.

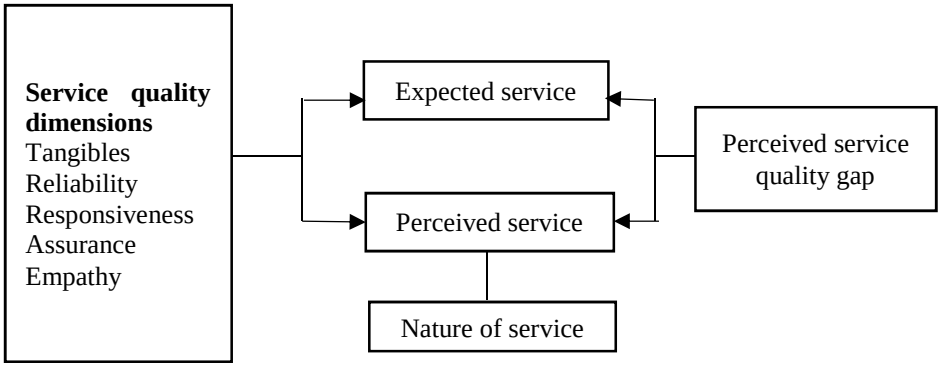

Figure 1. Theoretical framework showing the perceived service quality gap.
Source: (Mukokoma & van Dijk 2011)

The dimensions and indicators/features shown in table 1 are generally used twice to measure customer's expectations of performance of the service provider and perceptions of performance of the same service provider (Lee 2004; Mukokoma & van Dijk 2011). The score ratings for both expectation and perception are measured by a seven-point Likert scales. However, some studies have modified the scale to a ten-point in order to give a respondent wide rating margin (OJO 2011). For the interest of this study, a 7- point Likert scale was adopted as it is mostly used in similar studies. Service quality gap is therefore computed by subtracting overall expectation mean scores from perceived mean scores for each SERVQUAL dimension.

$$\text{Service Quality (SQ)} = \text{Perception (P)} - \text{Expectation (E)} \qquad (1)$$

The results of the service quality gap score may be positive, negative and/or a zero depending on the customers' perception and expectation of the particular service. Lee (2004) and Mukokoma & van Dijk (2011) stressed that quality is unsatisfactory when expected service exceeds perceived service (negative gap score). That is, the bigger the negative gap scores the higher the level of unsatisfactory service. When expected service equals perceived service (zero gap score), quality is satisfactory and when perceived service exceeds expected service (positive gap score) then service level is more than satisfactory.

1.2 Criticism of service quality

Even though the SERVQUAL instrument is accepted as a valid and reliable instrument (Parasuraman et al. 1985; Parasuraman et al. 1988; Parasuraman & Berry 2004; OJO 2011; Mukokoma & van Dijk 2011; Bhagwandin 2011), it is subjected to some criticism (Cronin & Taylor 1994; Hill et al. 2007) . The model is criticised on its methodology especially on the use of ten-point numerical scale over a seven point Linkert scale and the use of expectations and perception scores (Lages & Fernandes 2005; Hill et al. 2007). For instance, Hill et al. (2007) criticized the use of seven-point scale and a ten-point scale as a major factor leading to development of different thoughts. He then proposed for the use of numerical ten-point scale than the verbal or Likert scale as it is statistically suitable for monitoring and improving customer satisfaction. On expectation and perception, Cronin & Taylor (1994) criticized on operationalization of the SERVQUAL instrument which mainly confounds on satisfaction and attitude [see OJO (2011)]. Cronin & Taylor (1994) later proposed performance-based and the performance-minus-expectations as an appropriate basis for use in the measurement of service quality. However, these modifications have lacked enough backup information to be considered valid. After the refinement of the SERVQUAL instrument, Parasuraman et al. (1994) concluded that the instrument is the most reliable for any service quality research. Although SERVQUAL dimensions have been criticised, the instrument is widely used in published and modified form for performance gap analysis.

2. Materials and methods

2.1 Study area description

The study was conducted in Malawi's capital, Lilongwe city (fig.1). Lilongwe city lies between 33.5 ^{0}E and 34.5 ^{0}E longitudes and between 14.5 ^{0}S and 13.5 ^{0}S latitudes (Chidya et al. 2016). It became the capital of Malawi in 1975. The city has a total land area of 328 square kilometers with population density of 1479 persons per km^2 (UN-HABITAT 2011). The city is faced with rapid urbanization and is regarded as the fastest growing city in Malawi (National Statistical Office 2008; Chidya et al. 2016). Water supply in the city is operated on and supplied by the Lilongwe Water Board (LWB). LWB is mandated by the act of parliament to supply quality drinking water in all Lilongwe City Council (LCC) areas. However, water supply in the city has been poor due to prevalent water intermittence (UN-HABITAT 2011; JICA 2010; Chidya et al. 2016) which may affect customers' levels of satisfaction with the service delivery.

The city has about 58 Lilongwe City Council (LCC) areas and it intends to expand through inclusion of other areas such as areas 59, 60 and 61 (JICA 2010). Ten of the 58 LCCs namely areas 36, 22, 24, 3, 47, 49, 44, 8 (Mchesi), 1 (Falls estate) and 58 (Chinsapo) were purposefully selected and used as study sites. The study sites were selected based on the availability of water supply distribution system/network. Areas 36, 24, 22 are located in the southern part of the city, areas 3, 47, 57 (Chinsapo) and 44 in the centre while, area 49 is located in the northern part of the city. These areas are further classified by the LWB into three major supply zones; Northern, Southern and Central. Areas 36, 22, 24, 44, Mchesi and Chinsapo are all in the southern zone, areas 3 and 47 in the central zone while, area 49 in the northern zone. All the study sites had interrelated characteristics such as the presence of large low-class working population and water supply intermittences.

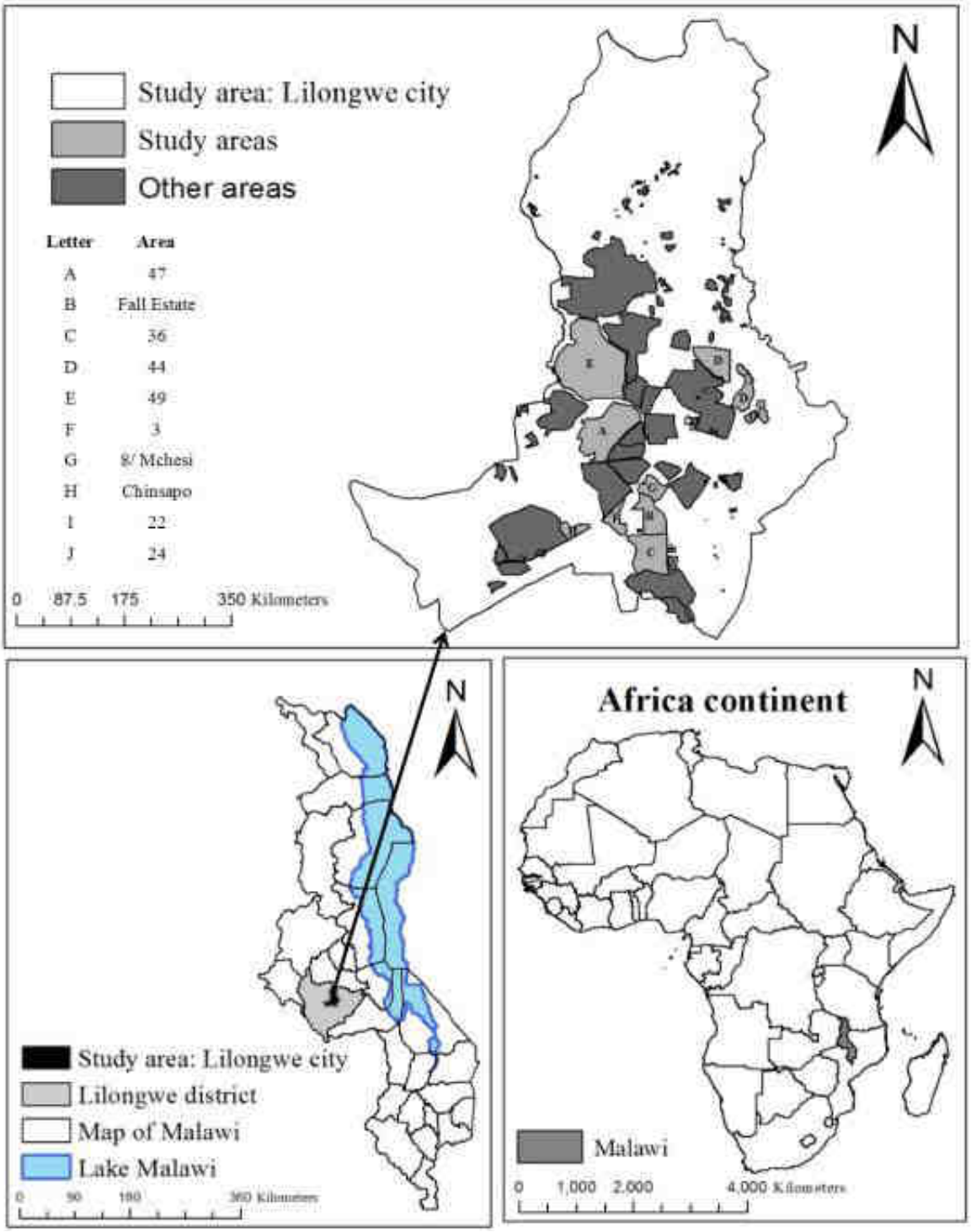

Figure 2. Map of Lilongwe city showing the study areas

2.2 Framework of the study

The study was guided by the Water SERVIQUAL model, table 1. Then the theoretical framework, figure 1 was employed to determine the service quality gap from the three water supply zones (Northern, Central and Southern).

2.3 Sampling

The sample size was determined based on the total number of domestic/residential customers in Lilongwe city. A confidence Interval (CI) of 95% with a sampling Margin of Error (MoE) of ±3% was selected as previously used in a similar study by (OJO 2011). The required household sample size was then determined by using the same formula that (OJO 2011) used as shown below.

$$n = \frac{t^2 P(1-P)}{m^2} \qquad (2)$$

Where;
n = required sample size
t = confidence level at 95% (having a standard deviation value of 1.96)
p = estimated prevalence of population in the study area (0.92)
m= margin of error at 3% (having a standard deviation value of 0.03)

Using the preselected CI of 95%, MoE of +3% and the expected probability of 0.92 to calculate the required sample size (n), a total of 342 household sample size was determined for the interviews. Random sampling was then applied to select 10 existing LCC of the city. Due to missing data on the total number of residential customers of LWB in some LCCs, at least 34 respondents were targeted per LCC. Household were then selected randomly from the LCC in the city's water supply zones.

2.4 Data collection

In order to achieve the intended objective of the research, a questionnaire was designed. The questionnaire contained the SERVQUAL instrument (table 1) related questions to better capture the actual performance of the LWB through customer voice. The questionnaire was designed to collect data pertaining to customer expectations (quality expected) and perceptions (quality perceived). Mean scores for expectations and perceptions for every feature of the SERVQUAL dimensions were compared for accurate service quality evaluation. Then 7-point Likert scales was used to rate the perceived and expected service quality for all attributes, where 1 was considered as the lowest rated and 7 being the highest rated. The respondents rated the service quality based on their expectation and perception on a 7-point Likert scale as used by (Ching 2004b; Mukokoma & van Dijk 2011) where;

1 Strongly disagree
2 Disagree
3 Somewhat disagree
4 Neither agree nor Disagree
5 Somewhat agree
6 Agree
7 Strongly agree

Overall, data was collected from 266 of the 340 targeted customers, thereby achieving responsive rate of 78% which is higher than responsive rates achieved by similar studies (Ching 2004b; OJO 2011). This simply shows the eagerness of the household to take part in the study which may be implicated to poor service quality delivery.

2.5 Data analysis

The statistical package for Social Scientist (SPSS 20) was used to analyse data. Data processing followed the five stages of quantitative data analysis as employed by Ojo (2011). Mean score ratings for expectation and perception for each service dimension were calculated. Then the service gap was calculated by computing the mean difference between the ratings that customers assigned to the paired expectations and perception features (Lee 2004; Mukokoma & van Dijk 2011). Positive service quality gap indicated that customer(s) expectations

were exceeded hence were satisfied with the service received. While, a negative SQ score gap indicated that customer(s) perceived quality service were below their expectation, thus dissatisfied with the service received. A zero SQ gap indicated that the service received equaled the customer (s) expectations. The overall service quality gap mean was then calculated by summing up all the service gap mean scores for the five dimensions. A paired sample test was conducted to determine if there was a significant difference between mean expectation scores and perception scores. Excel was used to display the results visually in graphs and tables.

3. Results and discussions

3.1 Service quality mean scores for expectation and perception for the southern zone

Table 2. Mean scores for expectation and perception for the five dimensions in the southern zone

Dimensions	Expected Quality mean score	Standard deviation	Perceived quality mean score	Standard deviation	Sig. (2-taled)
Reliability	6.29	0.674	3.23	1.634	0.001
Responsiveness	6.05	0.816	3.76	1.021	0.001
Tangibles	6.03	0.847	4.04	1.089	0.001
Assurance	5.68	0.907	3.96	0.940	0.001
Empathy	5.87	0.713	4.02	0.987	0.001
Average	5.98		3.80		

As can be seen in table 2, the overall expected quality had high average mean value (5.98) than the perceived quality (3.80). This demonstrates a shortfall in meeting customers' expectation in this water supply zone. The expectation for all the dimensions were high with mean scores above 6, except for assurance and empathy. This agrees to other service quality gap analysis studies of water utility companies, where expected mean scores above 6 for the dimensions were reported (Ching 2004; Mukokoma & van Dijk 2011). The computed mean score on a 7-point scale for expectation and perception showed significant difference (p=0.001) across all dimensions. Lower perceived scores may be attributed to water intermittences in the service areas due to pipe bursts and dilapidated water distribution systems as reported by JICA (2010) and UN-HABITAT (2011). In this zone alone, 944 faults (36 pipe bursts), were reported in the year 2009. Furthermore, LCC (2013) report revealed that LWB prioritizes on providing the population with safe water supply system than improving the service levels. Therefore, balancing the resource allocation in service distribution system expansion and maintenance may improve customer satisfaction with the service thereby reducing the performance gaps.

3.2 Service mean scores for expectation and perception for central zone

Similar to the southern zone, the mean scores for the central zone for expectation were also above the perceived mean scores. The highest expectation mean score was for reliability (6.55) while the lowest was for assurance (6.32) and empathy (6.32). On the other hand, the highest mean score for perceived quality dimensions was for empathy (4.29) and the lowest was for tangibles (2.68) and reliability (3.32). This means that the perceived quality was below the actual expectation of the customers. Although literature reports that it is not common for water utility to meet customer's expectation (Mukokoma & van Dijk 2011), lower perceived mean score ratings less than three (3) should be an area of concern. A paired sample test results revealed significant difference (p=0.001) between expectation and perception scores for all dimensions tested. The results presented in table 3 show that the performance needs to be improved by concentrating more on tangibles and reliability features/indicators. If more resources are allocated to each dimension to address the causal factors to lower perception ratings, the service quality delivery will improve in the future.

Table 3. Mean scores for expectation and perception for central zone

Dimensions	Expected Quality mean score	Standard deviation	Perceived quality mean score	Standard deviation	Correlation	Sig. (2-taled)
Reliability	6.55	0.624	3.32	0.541	-0.344	0.001
Responsiveness	6.26	0.729	3.97	1.169	-0.186	0.001
Tangibles	6.39	0.667	2.68	0.653	-0.163	0.001
Assurance	6.32	0.702	3.77	0.805	0.015	0.001
Empathy	6.32	0.653	4.29	0.643	0.405	0.001
Average	6.37		3.61			

3.3 Service scores for expectation and perception for northern zone

Table 4 reveals that actual service requirements/expectations by customers are higher than the perceived service quality delivery. Reliability has the lowest expected mean, 5.97 than tangibles (6.16), assurance (6.26), empathy (6.32) and responsiveness (6.39). However, it also has the least perceived quality/satisfaction mean as compared to responsiveness, tangibles, assurance and empathy. The computed average mean score on a 7-point scale for expectation and perception are 6.22 and 3.73 respectively. Lower perceived scores for the dimensions indicate that customers perceived the utility's performance to be below their expectations. A paired sample test results revealed significant difference (p=0.001) between expectation and perception scores for all dimensions tested. This means that we accept the alternate hypothesis and reject the null hypothesis that there are no differences between perception and expectations rating for the SERVQUAL dimensions in the study zone. The overall mean scores, standard deviation values for expectation and perception and the correlations are presented in the table 4 below.

Table 4. Mean scores for expectation and perception for northern zone

Dimensions	Expected Quality mean score	Standard deviation	Perceived quality mean score	Standard deviation	Correlation	Sig. (2-taled)
Reliability	5.97	0.795	2.77	0.717	-0.189	0.001
Responsiveness	6.39	0.558	3.35	0.486	0.214	0.001
Tangibles	6.16	0.779	4.06	0.854	0.134	0.001
Assurance	6.26	0.514	4.29	1.216	-0.230	0.001
Empathy	6.32	0.702	4.16	0.638	0.029	0.001
Average	6.22		3.73			

4. Overall Service quality gap

The quality of service delivery is computed by determining the difference (gap) between the perceived and expected quality for each water SERVQUAL dimensions. The gap scores for the three water supply zones are shown in table 5 below.

Table 5. Performance gap analysis for LWB

	Southern zone			Central zone			Northern zone		
Dimensions	Qe *	Qp**	Service Quality Gap	Qe	Qp	Service Quality Gap	Qe	Qp	Service Quality Gap
Reliability	6.29	3.23	-2.03	6.55	3.32	-3.23	5.97	2.77	-3.20
Responsiveness	6.05	3.76	-2.29	6.26	3.97	-2.29	6.39	3.35	-3.04
Tangibles	6.03	4.04	-1.99	6.39	2.68	-3.71	6.16	4.06	-2.10
Assurance	5.68	3.96	-1.72	6.32	3.77	-2.55	6.26	4.29	-1.97
Empathy	5.87	4.02	-1.85	6.32	4.29	-2.03	6.32	4.16	-2.16
Average	5.98	3.80	-2.18	6.37	3.61	-2.76	6.22	3.72	-2.50

*symbol represents quality expected
** represent quality perceived

As can be seen in table 5 above, there are negative service quality scores for all dimensions. This indicates that customers' expectation are not met across all dimensions in all three water supply zones. The findings of this study are similar to previous studies by OJO (2011), Ching (2004) and Mukokoma and van Dijk (2011) in which negative service quality gap scores were reported. For the southern zone, the highest service quality gap is for responsiveness (-2.29) followed by reliability (-2.03), tangibles (-1.99), empathy (-1.85) and assurance (-1.72). In general, the southern water supply zone has the overall service quality gap of -2.18 which is small when compared to the gap scores for northern (-2.50) and central (-2.76). Smaller average gap score for the southern zone may be attributed to timely response to customer complaints and faults management due to its proximity to the LWB Head office and the southern zone office than central and northern zones. Contrary to the southern zone, tangibles have the highest service quality gap score of -3.23 in the central zone, followed by reliability (-3.23), assurance (2.55) responsiveness (-2.29) and empathy (-2.03). Gap analysis for northern zone shows that reliability (-3.20) and responsiveness (-3.04) have the widest service quality gaps than empathy (-2.16) tangibles (-2.10) and assurance (-1.97). According to Parasuraman et al. (1988), a gap score of -2.5 and above is significant and requires urgent managerial action. As shown in the table 5 above, all gap scores for the southern zone are less than -2.50, but if no any improvement is done on service delivery, the gaps will still continue to widen thereby, continue to affect customer perception for the service delivery. There is a need to reduce the service quality gaps for responsiveness and reliability before they reach a critical point (-2.5). Contrary to the southern zone, the gap score for central zones are all above -2.50 except responsiveness and empathy while in the northern zone the gap scores are all above -2.50 except for tangibles, assurance and empathy. OJO (2011) suggested that areas with the widest gap score should be considered as a priority for any improvement. Therefore, the priority areas for improvement in this case are the central (-2.76), northern (-250) followed by the southern zone (-2.18).

In order to establish a valid reason for wide service quality gap scores for reliability and tangibles, the annual volume of water produced and sold from the year 2013 to 2015 was analysed (figure 3). Volume of water produced since 2013 has been increasing with a slight improvement on the volume sold. In 2013 alone, the utility encountered significantly high level of unaccounted water (NRW) of 11.87 million m^3 while, in 2014 and 2015 it registered 11.89 and 12.34 million m^3 respectively. This means that large volume of water which could be supplied to customers is lost every year through physical and management losses (LCC 2013; UN-HABITAT 2011) leading to persistent water interruptions in the city. To augment for water supply shortages, LWB has embarked on provision of potable water to households through rationing (JICA 2010). This initiative may not be considered as acceptable long-term permanent service provision standard if the SERVQUAL gaps are to be reduced. More effort should therefore be put on reducing the SERVQUAL gaps scores by expanding the water sources, rehabilitating the old existing water storage tanks, pumps and pipes, provisioning of proper in-service staff training in customer care, installation of leak detective systems, provisioning of incentives to well performing staff and having customer needs and wants at heart and eager to improve the quality of service.

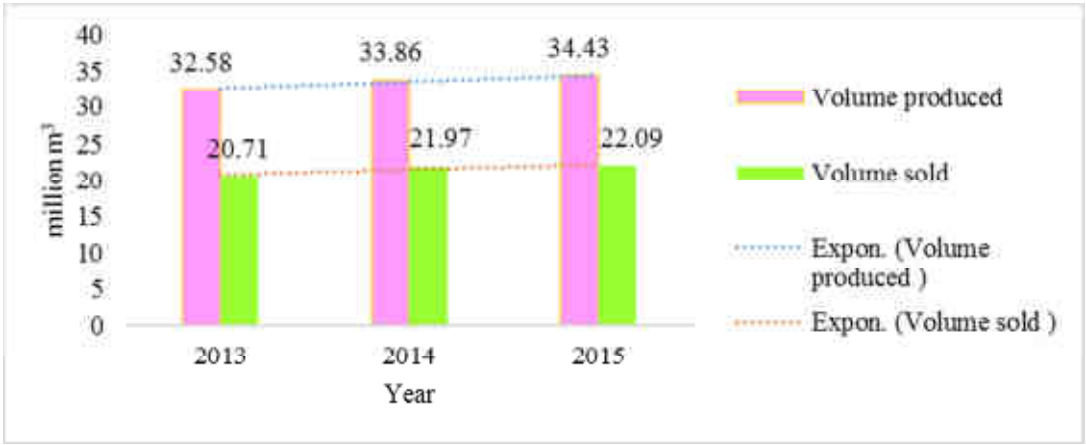

Figure 3. Volume produced and sold

5. Conclusion

LWB is striving to achieve high standard water service quality delivery in all its water supply zones. The performance gap analysis had shown that the utility is close to meeting its customer expectation. The central zone has a service quality gap of -2.79 while, northern and southern have a gap of 2.50 and -2.18 respectively. The gaps are significantly small as compared to other studies. Therefore, if LWB concentrates on reducing the gaps for dimensions such as reliability, responsiveness, tangibles and assurance in the three zonal areas, the level of service will improve which will lead to higher customer satisfaction and improved service delivery.

The allocation of investments should target the areas with the wide gaps, more specifically on water service quality model indicators as shown in the table 1. It will be more interesting if the utility comes up with different programs that will specifically reduce the gaps per SERVQUAL dimensions.

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