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Assessment and Consumer Satisfaction Survey of Public Water Supply in Ilorin: A Case Study

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ABSTRACT

Background: The management of the public water supply in Ilorin by the Kwara State Water Corporation has caused significant concern among the city's citizens. This study used consumer satisfaction as an index to evaluate Ilorin's public water supply.

Methods: A stratified random sample procedure was employed to distribute structured questionnaires to 400 inhabitants, who were asked to rate and provide their perceptions of five selected parameters known as satisfaction drivers. Descriptive statistics, including frequency tables, percentages, and charts, were used to analyze and present the data. Additionally, the consumer satisfaction index (CSI) models were utilized.

Results: The overall CSI was calculated to be 3.24 points on a 5-point scale. The primary factors contributing to consumer satisfaction were supply quality (3.70 points), while supply frequency and duration had the least impact on satisfaction (2.66 points). These findings suggest that the public water supply services provided to the residents were insufficient. Furthermore, consumers were willing to pay an average of ₦4,423.78 per month for enhanced service delivery.

Conclusion: The study recommends that the water utility company make the required adjustments to its systems and processes while prioritizing consumer satisfaction. By doing so, the company can increase revenue generation and assure the sustainability of its services.

1. Introduction

Water, an essential element for sustaining life, holds immense significance for humanity and is considered a divine gift [1]. Access to clean and potable water is not only a fundamental human necessity but also a basic human right [2]. Its availability, use, and spatial distribution are directly related to economic development and the overall well-being of both local and global communities [3, 4]. A large portion of the global population, particularly in Sub-Saharan Africa and South Asia, still lacks access to safe water and proper sanitation due to the ineffective management of water resources by governments worldwide [5, 6]. In Nigeria, for instance, State Water Agencies (SWAs) such as the Kwara State Water Corporation in Ilorin, are responsible for providing public water supply infrastructure and services. However, these SWAs encounter numerous obstacles including poor management, insufficient budget allocations by the respective governments, deteriorating facilities, frequent equipment breakdowns, inadequate infrastructure investment, unstable power supply, unmotivated staff, ineffective revenue collection, urbanization, and corruption

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[7, 8]. Consequently, these challenges hinder SWAs from delivering satisfactory services, leading to consumer dissatisfaction. Another concern arises from the monopolistic nature of SWAs, which often results in a lack of emphasis on ensuring customer satisfaction [9]. Instances of substandard water supply, erratic provision, low pressure, and prolonged periods without water have been documented, indicating a failure to meet the expected and necessary standards of service for consumers. The current state of water supply in the Ilorin metropolis is characterized by significant inadequacy, despite substantial investments in public resources over the years [10-12]. The Kwara State Water Corporation, the agency in charge of providing water to the residents in the study area, has faced severe constraints in meeting the increasing demand for domestic potable water [13]. As a result, a majority of the residents in the Ilorin metropolis heavily rely on boreholes or low-quality wells for their water needs. According to the aforementioned reports highlighting the inadequate water supply and resulting customer dissatisfaction in the study area, it becomes imperative to conduct a consumer satisfaction survey. Such serveys are valuable tools for organizations to assess their performance and identify key factors that contribute to customer satisfaction [14]. This fundamental idea applies to all service-based sectors, including the water utility sector, as it aids in enhancing performance and sustainability [15, 16]. Research indicates a positive correlation between customer satisfaction and their willingness to pay (WTP) for water services. The level of satisfaction with the services received can directly influence the calculation of WTP for water rates [14, 17]. Therefore, prioritizing the improvement of customer satisfaction becomes crucial in enhancing WTP, overall service delivery, revenue generation, and long-term service sustainability. Over time, there has been a growth in the amount of literature on various elements of water delivery to provide stakeholders and policymakers with the crucial knowledge they need to make decisions that will result in sustainable water distribution by public water utilities. To date, no comprehensive survey conducted to specifically examined the level of satisfaction among residential/household customers regarding the public water supply in Ilorin. By conducting an assessment that utilizes consumer perception and ratings of five selected variables, referred to as satisfaction drivers, this study aims to augment the existing knowledge on the subject of public water supply. The intended outcome of this study is to enable the Kwara State Water Corporation, the public water utility/SWA, to identify its areas of strength and areas requiring improvement based on consumers' ratings of the satisfaction drivers. Consequently, this assessment will facilitate well-informed decision-making processes, ultimately leading to enhanced service delivery and overall customer satisfaction. Furthermore, the findings of this study will establish a foundational dataset for future research endeavors, providing valuable insights and recommendations for stakeholders and the general public alike.

2. Materials and Methods

A cross-sectional descriptive design was employed in this study, using Google Forms, Google Sheets, and Microsoft Excel as tools for data entry, cleaning, analysis, and presentation. Both primary and secondary data were used to produce the data for this study. The primary data collection for this study involved field observations and measurements. The sample size was determined to be 400 individuals. The data collection methods included administering questionnaires, conducting face-to-face interviews, utilizing e-questionnaires, and making personal field observations. A stratified random sampling technique was employed, resulting in a total of 326 responses obtained from the research region. Following data cleaning procedures, 319 valid responses remained for analysis, which accounts for approximately 80% of the initially selected sample size and is considered an acceptable response rate for this study [18, 19]. Moreover, secondary data obtained from the Kwara State Water Corporation was incorporated into the study. Descriptive statistical techniques such as frequency distribution tables, means, and charts were employed to examine the data provided by the respondents in this study.

2.1 Description of Study Area

Figure 1 illustrates the geographical location of Ilorin, the capital of Kwara State, within Nigeria. It is situated between latitudes 8°30′ and 8°50′N and longitudes 4°20′ and 4°35′E. Ilorin falls within the North Central geopolitical zone of Nigeria. The city is located in the southernmost region of Kwara State, encompassing an approximate area of 468 km^2. It occupies a transitional zone between the forest and Guinea savannah ecological zones of Nigeria [4].

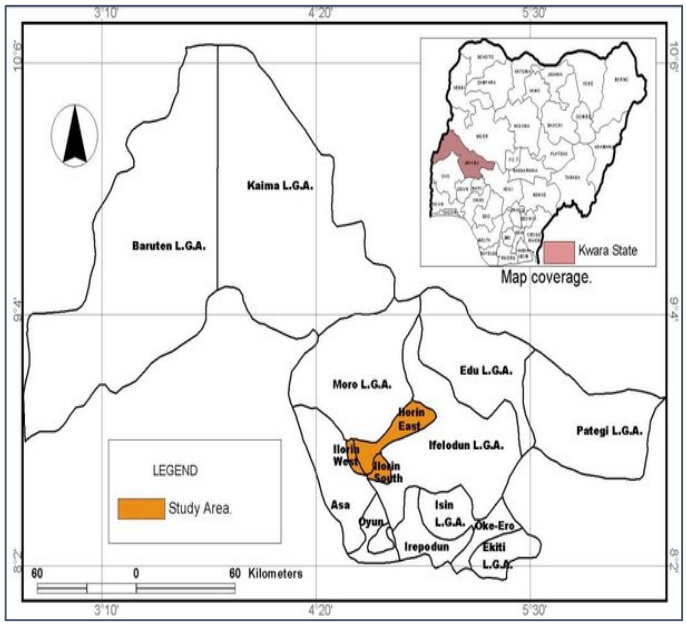

Figure 1. Map of Kwara state showing the study area insert is the map of Nigeria [20]

The climate of the research area can be classified as tropical wet and dry. It is characterized by distinct dry and wet seasons. The dry season lasts from November to March, while the wet season spans from April to November [21]. In Ilorin, the weather fluctuates between 33 and 35 °Cduring November to January, and between 34 and 37 °C from February to April. The dry season is characterized by hot and warm days. The region receives an annual rainfall ranging from 990.3 mm to 1318mm. The city's water supply primarily relies on three main rivers: Oyun, Asa, and Moro, which serve as significant sources of water for Ilorin [13]. The city of Ilorin comprises three local government areas, namely Ilorin East, Ilorin South, and Ilorin West. According to the National Population Commission (NPC) in 2006, the population of Ilorin was estimated to be 777,667 in 2007. However, as of the present, it is projected that the city′s population has increased to approximately 1,181,929 individuals in 2022 [22].

2.2 Data Sampling and Collection

To ensure a comprehensive representation of the study area and to facilitate the sampling of various water supply characteristics across different sub-divisions, the study area of the Ilorin metropolis was categorized based on land use patterns, population density, and zonal location. This categorization aimed to ensure a fair and representative selection of areas within the study. The research primarily focused on the following specific areas: Oke-Odo: This area is characterized by a high population density and is predominantly inhabited by students. GRA (Government Reserved Area): This is a high-income residential area. Egbejila: This area has a relatively low population density. Irewolede and its estate: This area is planned and organized. Ipata: This area has a high population density and is characterized by unplanned residential settlements. Adewole: This area has a moderate population density. Agbede: This area is characterized by low-income households. Oke-Ose, Gaa-Akanbi, Tanke, Fate, Asa Dam, and Osere: These areas are characterized by low-income households and unplanned settlements, encompassing both student and non-student residential areas. The determination of the number of questionnaires administered for the study was based on the Yamane formula [23], denoted by Equation (1.1). By utilizing this formula, a sample size of 400 was calculated. Once the sample size was determined, a stratified random sampling technique was employed from the study area. The study area was divided into categories based on the aforementioned parameters, including zonal location, population density, and land use pattern. Subsequently, random sampling was conducted within each category to ensure representative sampling across the various subdivisions.

$$n = \frac{N}{1 + N(e)^2} \quad \ldots\ldots\ldots\ldots \text{eq. (1.1)}$$

Where: n = sample size, N = population, e = level of significance (0.05).

$$\text{Thus, } n = \frac{1{,}181{,}929}{1+1{,}181{,}929\ (0.05)^2} = \frac{1{,}181{,}929}{1+1{,}181{,}929\ (0.0025)} \qquad n = 399.87 \approx 400$$

For further investigation, the data and information collected from the filled-out questionnaires and remarks obtained through oral interviews were compiled. Then, the collected data underwent a process of data cleaning. Following data cleaning, the data was analyzed and presented using appropriate descriptive statistics and relevant formulas.

2.3 Data Analysis

In this study, consumer satisfaction with the public water supply was measured using the Likert scale, which is a commonly employed method in social and behavioral science research. The Likert scale has been widely used and is considered to be 90% reliable based on empirical evidence [24-26]. To evaluate consumer satisfaction with the public water supply, five satisfaction drivers were selected: quantity supplied, water pressure, quality supplied (including taste, color, content, and smell), and reliability (consistency in delivery frequency, timing, and pressure). These specific factors were chosen based on prior research and a thorough review of relevant literature. Consumers were asked to rate each satisfaction driver on a 5-point Likert scale, using the following categories: very poor, poor, average, good, and very good. This allowed for the quantification of consumer perceptions and ratings regarding each satisfaction driver. Additionally, descriptive statistics were employed to analyze the collected data and gain a better understanding of the consumer ratings regarding the five drivers of satisfaction in the public water supply. Furthermore, an additive Consumer Satisfaction Index (CSI) model, previously used in a related study [14], was utilized to assess the respondents' ratings of the five drivers of satisfaction. The CSI additive model allows for the calculation of an overall satisfaction index based on the individual ratings of each driver. The Consumer Satisfaction Index (CSI) additive model is presented in Equation 1.2 and Equation 1.3 below.

$$CSI = \sum_{i=1}^{n} \frac{rwi}{n} \quad \ldots\ldots\ldots\ldots\ldots \text{eq. (1.2)}$$

$$rwi = \sum_{j=1}^{n} \frac{(sj \times nj)}{ti}; j = 1,2,3,4,5 \quad \ldots\ldots\ldots\ldots\ldots \text{eq. (1.3)}$$

Where, CSI = Consumer satisfaction index.

rwi= rating weight index for each satisfaction driver, a number between 1-5.

n= number of satisfaction drivers (5).

sj= satisfaction unit weight, an assigned number between 1-5.

nj= number of respondents to j^{th} weight.

ti= total respondents to i^{th} satisfaction driver.

The satisfaction unit weights for the Likert scale are defined as follows: very poor = 1 point; poor = 2 points; average = 3 points; good = 4 points; very good = 5 points. In order to categorize the levels of customer satisfaction with the public water supply based on the calculated CSI, the following scale was used: Very poor = CSI scores ranging from 1.00-1.49 points; Poor = CSI scores ranging from 1.50-2.49 points; Average = CSI scores ranging from 2.50-3.49 points; Good = CSI scores ranging from 3.50-4.49 points; and Very Good = CSI scores ranging from 4.50-5.00 points [26].

3. Results and Discussion

3.1 Local Government Distribution

The study covers 3 local governments as shown in Fig 2. These local governments include Ilorin West, Ilorin East, and Ilorin South.

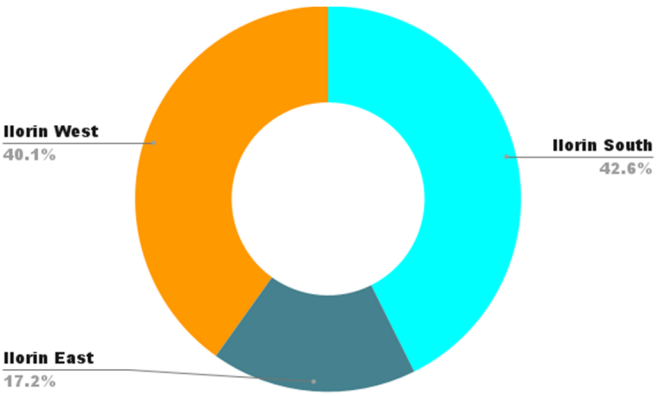

Figure 2. Distribution According to Local Government Area

3.2 Demographic Characteristics of Respondents

This study examined the demographic characteristics of the 319 respondents in the study area. The summarized results are presented in Table 1.

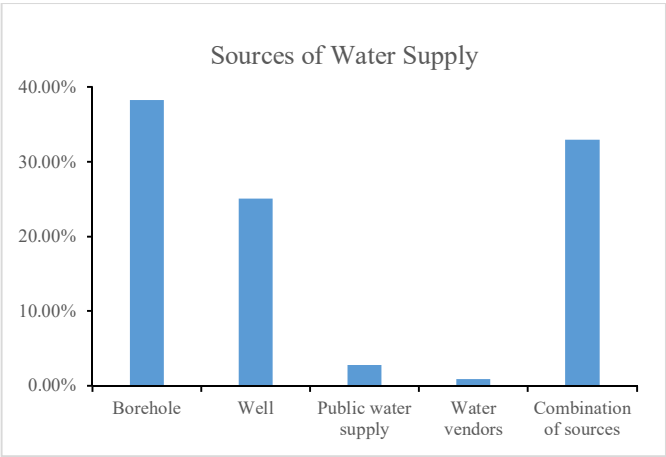

Figure 3. Sources of Water Supply

Table 1. Demographic Characteristics of Respondents

Questionnaire Variable	Response Variable	Number of Respondents	Percentage Response (%)
Gender	Female	154	48.27
	Male	163	51.10
	Prefer not to say	2	0.63
Age(years)	16-20	35	10.97
	21-35	184	57.68
	36-50	63	19.75
	≥51	37	11.60
Educational Level	Tertiary	226	70.85
	Secondary	65	20.38
	Primary	17	5.33
	No formal education	11	3.47
Marital Status	Single	157	49.22
	Married	157	49.22
	Divorced	2	0.63
	Widow/Widower	3	0.94
Monthly Household Income (₦)	≤10,000	25	7.84
	11,000-30,000	72	22.57
	31,000-50,000	67	21.00
	51,000-100,000	67	21.00
	101,000-500,000	50	15.67
	≥501,000	12	3.76
	Declined to Respond	26	8.15

Figure 3 illustrates the various sources of water supply in the city of Ilorin, which include, but are not limited to, wells, boreholes, public taps and pipes, streams, rivers, and rainfall. According to the study's findings, approximately 68.34% of respondents' households rely on boreholes as their primary source of water. This high percentage indicates that boreholes have become a popular choice among residents due to the perceived unreliability of the water supply in the Ilorin metropolis. Boreholes offer a more dependable and readily available water source, which is of high quality. Moreover, the study revealed that 60.82% of respondents' households use boreholes as their primary source of water. This further emphasizes the preference for boreholes as a solution to address the intermittent water supply issues experienced in Ilorin. The prevalence of boreholes as the primary water source highlights the significant impact of the perceived unreliability of the public water supply in the city, leading residents to seek alternative options that offer consistent availability and better quality water [21].

3.3 Public Water Supply to Households

The Kwara State Water Corporation, as previously mentioned, is responsible for managing the public water supply in the city of Ilorin. The corporation obtains raw water from the state's dams, treats it, and then distributes it to different locations within the city. However, the study

findings indicate that a mere 17.87% (57 out of 319 respondents) reported having access to public water pipes within their households. According to the data on water rate payments, a mere 7.52% of respondents who receive public water supply reported paying the required water rate, while the majority, 92.48%, did not pay for the public water supply. The reasons cited for not paying included the absence of water supply, inadequate supply, and financial constraints. It is noteworthy that respondents who were civil servants mentioned that irrespective of their access to public water supplies, certain deductions labeled as "water rates" were routinely subtracted from their monthly salaries.

3.4 Consumer Perception on Public Water Supply in Ilorin Metropolis

In this study, the satisfaction levels of residential consumers in the Ilorin metropolis regarding the public water supply were assessed using ratings for five selected parameters, referred to as satisfaction drivers. These drivers include supply quantity, water pressure, supply frequency, and duration, reliability in terms of adhering to predetermined schedules, and water quality in terms of taste, color, and odor. It is important to note that only 57 respondents in the consumer survey had access to public water in their homes. The responses from these respondents, reflecting their perceptions and satisfaction ratings, are presented in Table 2. This table provides valuable insights into how consumers evaluate and perceive the public water supply based on the specified parameters. In order to calculate the total level of consumer satisfaction, Equations 2 and 3.3, along with the data provided in Table 2, were utilized. The results of these calculations are presented in Table 3, which displays the RWI (Rating Weight Index) for each satisfaction driver. The RWIs, ranging from 2.6 and 3.70 on a scale of 5, indicate the levels of satisfaction for each driver, with supply quality receiving the highest rating and frequency and duration receiving the lowest rating among the satisfaction drivers. Based on the methodology used, the overall Consumer Satisfaction Index (CSI) was estimated to be 3.24. On the CSI scale, this score indicates that the public water supply in the Ilorin metropolis is perceived as average by its residents. This finding aligns with earlier research conducted in Africa, including Nigeria, which revealed deficiencies in public water systems across many African nations [7, 27, 28].

$$\mathrm{CSI} = \sum_{i=1}^{n} \frac{\mathrm{rwi}}{n} = \frac{16.2}{5} = 3.24$$

The study also examined the influence of consumer factors such as gender, age, educational attainment, and income on perception, ratings, and overall satisfaction. The effect of these socio-demographic characteristics on the satisfaction drivers and the overall Consumer Satisfaction Index (CSI) was analyzed. Table 4 presents the Relative Weighted Index (RWI) values calculated by gender, indicating the similarities in the overall perception of each satisfaction driver between males and females, except for the quality supplied, which showed the most significant variance. However, both male and female CSIs fell within the range of the average rating, suggesting similar levels of overall satisfaction between the genders. Similarly, the RWIs by age groups exhibited a comparable pattern, with minor variations observed for the satisfaction drivers across different age groups. All estimated CSIs, as displayed in Table 4, fell within the average rating, except for the 16-20 age group, which was slightly below the average-good rating. It is worth noting that this age group constituted only approximately 7% of the total respondents and can be considered a smaller proportion of the sample. The RWIs by educational level exhibited a notable consistency throughout the table, except for the group categorized as having no formal education, which appeared as an anomaly. The limited representation of respondents within this category, comprising merely 3.5% of the total sample, raises concerns about its adequacy as a representative subset and necessitates caution in interpreting the ratings derived from this subgroup. Conversely, the CSIs for all other educational levels, as depicted in Table 5, were found to fall within the average rating range. The RWI values by monthly income are shown in Table 5 below. The RWI values generally show a decline in rating with rising income, except for the ₦31,000-₦100,000 income group, which appeared to deviate from this pattern. This may be the case because, in contrast to low-income earners, this group of responders can afford nicer, more developed, and better-planned residential zones inside the city with more convenient access to the public water supply. The CSIs are rated as poor to average according to monthly income. The results of this study support those of earlier studies, indicating that consumer characteristics such as age, gender, and educational attainment do not significantly affect consumers' experience or perception. These factors do not appear to play a substantial role in shaping consumer satisfaction with the public water supply system. Regarding consumer income, the results are consistent with earlier studies that have found a negative association between higher income levels and consumer satisfaction. This suggests that individuals with higher incomes may have higher expectations or access to alternative water sources, leading to lower satisfaction ratings for the public water supply. The majority of the calculated Consumer Satisfaction Index (CSI) values across all consumer traits fell within the average rating range. However, the presence of outliers can be attributed to variations in respondents' expectations, experiences, perceptions, and cognitive assessments. Individual differences in these factors may contribute to the diverse range of satisfaction ratings observed in the study. [14]. Overall, it can be inferred from this study that Ilorin's public water system is ranked as average, which makes it insufficient and unsatisfactory.

Table 2. Consumer Perception/Ratings on Public Water Supply in Ilorin Metropolis

S/N	Satisfaction Drivers (Response%)	Very Poor	Poor	Average	Good	Very Good
1.	Supply frequency and duration	11	15	20	4	7
		19.30%	26.32%	35.09%	7.02%	12.28%
2.	Reliability	7	23	11	10	6
		12.28%	40.35%	19.30%	17.54%	10.53%
3.	Quantity supplied	2	8	19	17	11
		3.51%	14.04%	33.33%	29.82%	19.30%
4.	Water pressure	1	8	16	18	14
		1.75%	14.04%	28.07%	31.58%	24.56%
5.	Quality supplied	3	5	13	21	15
		5.26%	8.77%	22.81%	36.84%	26.32%

Table 3. Calculated Overall Consumers' Satisfaction Index of Public Water Supply in Ilorin Metropolis

S/N	Satisfaction Drivers	Very Poor	Poor	Average	Good	Very Good	Rating Weight Index (RWI) of Each Satisfaction Driver
		Unit Weight (1)	Unit Weight (2)	Unit Weight (3)	Unit Weight (4)	Unit Weight (5)	
1.	Supply frequency and duration	0.19	0.53	1.05	0.28	0.61	2.66
2.	Reliability	0.12	0.81	0.58	0.70	0.53	2.74
3.	Quantity supplied	0.04	0.28	1.00	1.19	0.96	3.47
4.	Water pressure	0.02	0.28	0.84	1.26	1.23	3.63
5.	Quality supplied	0.05	0.18	0.68	1.47	1.32	3.70
							Σrwi = 16.2

Table 4. Calculated Consumers' Satisfaction Index for Public Water Supply in Ilorin by Gender and Age

S/N	Satisfaction Drivers	Calculated Rating Weighed Index (RWI) for Each Satisfaction Driver					
		Gender		Age (Years)			
		Female	Male	16 – 20	21 - 35	36 – 50	51≥
1.	Supply frequency and duration	2.66	2.67	2.75	2.78	2.5	2.43
2.	Reliability	2.83	2.67	3.00	2.87	2.5	2.43
3.	Quantity supplied	3.58	3.39	4.00	3.53	3.43	3.00
4.	Water pressure	3.50	3.73	3.50	3.69	3.14	4.43
5.	Quality supplied	3.29	4.00	4.25	3.69	3.57	3.71
6.	Calculated CSI	3.17	3.29	3.50	3.31	3.03	3.20

Table 5. Calculated Consumers' Satisfaction Index for Public Water Supply in Ilorin by Educational Level and Monthly Income

S/N	Satisfaction Drivers	Calculated Rating Weighed Index (RWI) for Each Satisfaction Driver							
		Educational Level				Monthly Income (×1,000 ₦)			
		No Formal Edu.	Primary	Secondary	Tertiary	≤ 30	31 - 100	101 - 500	≥500
1.	Supply frequency and duration	3.50	2.50	2.30	2.73	2.52	2.91	2.44	2.00
2.	Reliability	2.50	2.50	2.70	2.78	2.91	2.95	1.78	2.00
3.	Quantity supplied	4.50	3.50	3.40	3.44	3.35	3.69	3.33	2.00
4.	Water pressure	5.00	3.50	3.70	3.56	3.61	3.74	3.67	2.00
5.	Quality supplied	4.50	4.25	4.00	3.54	3.78	3.74	3.56	3.00
6.	Calculated CSI	4.00	3.25	3.22	3.21	3.23	3.41	2.96	2.00

3.5 Consumers' Willingness to Pay Water Rates (WTP)

In the city of Ilorin, a total of 246 respondents expressed their willingness to pay a monthly price ranging from ₦100 to ₦50,000 for an improved and reliable public water supply. It is important to note that while some respondents stated their willingness to pay any amount, others did not provide a specific amount, and some respondents indicated that they were not willing to pay at all. The study revealed a generally low WTP for public water delivery among the respondents. This can be attributed to various factors, including the historical and current track record of service delivery by government-run organizations, including the Kwara State Water Corporation, which has often received negative ratings from consumers. The dissatisfaction and lack of trust in the performance of these organizations have raised concerns among the respondents, impacting their willingness to allocate funds for public water services.

4. Conclusion

The study's findings suggest that consumers' evaluations of the five selected satisfaction drivers indicate that the public water supply in Ilorin is perceived as average, with an overall consumer satisfaction score of 3.24 points. This indicates that the supply falls short of meeting customer expectations and leaves them disappointed. Among the satisfaction drivers, water quality received the highest rating, with a score of 3.70 points. However, supply frequency and duration received the lowest rating, with a score of 2.66 points. The data indicated that only 2.82% of the respondents in the study rely solely on the public water supply from Kwara State Water Corporation. This suggests that the majority of the population in the Ilorin metropolis depends on alternate water sources, such as boreholes and wells, to meet their water needs. Furthermore, the study found that 77.11% (246 respondents) were willing to pay an average monthly price of ₦4,423.78 for an improved and dependable public water supply. This willingness to pay is almost 100% higher than the existing water rates in Ilorin. However, it is important to note that this average price may be skewed due to some respondents with middle-to-high incomes indicating their readiness to pay higher amounts. The Kwara State Water Corporation should adopt a holistic strategy to improve service delivery and consumer satisfaction in the public water supply system. This strategy would involve the intervention of the state government in terms of funding and the creation and implementation of favorable policies. Additionally, the study recommends involving the private sector in investment, operation, and management of the water supply system, or exploring public-private partnerships. This approach has been shown to enhance service provision and generate income across various industries. By partnering with private entities, the water supply system can benefit from their expertise, resources, and efficiency, leading to improved service quality and reliability. Indeed, conducting a thorough investigation into the satisfaction levels of industrial and commercial customers with the public water supply in the Ilorin area is a valuable recommendation. Implementing the recommendations mentioned, such as involving the state government in funding and policy intervention, engaging the private sector through investment and partnerships, and improving service delivery, can contribute to the operational efficiency of the Kwara State Water Corporation. By enhancing operational efficiency, the corporation can provide better services, meet consumer expectations, and ultimately increase consumer satisfaction.

Authors' Contributions

Olubunmi Mokuolu: Conceptualization; methodology; investigation; project administration; resources; verification; visualization; writing-original draft; writing-review; editing. Funke Jegede: Conceptualization; data curation; formal analysis; methodology; investigation; writing-review and editing. Ayanniyi Ayanshola: Methodology; investigation; supervision; writing-review and editing. The Authors read and approved the final manuscript.

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Conflicts of Interest

The Authors declare that there is no conflict of interest.

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Ethical considerations

Ethics no: CREDIT/PROJ/2023/01.

References

1. Akpabio EM, Ansa IE. Water for Cities in Nigeria: The Governance Dimension. *Mediterr J Soc Sci.* 2013; 4(4): 297-309.

2. Abdulsalam ZB, Sule IO. Assessment of the Potability of Water Sources in Some Rural Communities in Ilorin East, Kwara State, Nigeria. *Sci World J.* 2020; 15(1): 84-9.

3. Mohammed SS. An Analysis of the Domestic Water Demand and Supply in Ilorin Metropolis, Kwara State (Master's Dissertation). 2016.

4. Ayanshola AM, Sule BF, Salami AW. Evaluation of Willingness to Pay for Reliable and Sustainable Household Water Use in Ilorin, Nigeria. *Ethiop J Environ Stud Manag.* 2013; 6(6): 754.

5. Girsha WD, Adlo AM, Garoma DA, Beggi SK. Assessment of Water, Sanitation and Hygiene Status of Households in Welenchiti Town, Boset Woreda, East Shoa Zone, Ethiopia. *Sci J Public Health.* 2016; 4(6): 435.

6. World Bank. Federal Democratic Republic of Ethiopia: Evaluation of MDGs Specific Purpose Grant to Regions.

7. Gowela JJ, Alleyne T, Chinopfukutwa GL. Service Quality Gap Analysis to Improve Public Water Service Delivery in Lilongwe City: Tapping Customer's Voice. *J Environ Earth Sci.* 2017; 7(4): 117-28.

8. Ohwo O. Challenges of Public Water Provision in Nigerian Cities: A Review. *J Water Sanit Hyg Dev.* 2016; 6(1): 1-2.

9. Jayaramu KP, Manoj Kumar B, Prasanna Rashmi KK. Customer Satisfaction with Domestic Water Supply in India-A Study in Hubli City. *J Environ Earth Sci.* 2014; 4(9).

10. AbdulAzeez. Ilorin Residents Groan Over Lack of Water. Daily Trust. 2019. Available from: https://dailytrust.com/ilorin-residents-groan-over-lack-of-water.

11. ENetSuD. Multi-Billion Naira Ilorin Water Reticulation Project: Waste of Tax Payers' Money-Enetsud to Kwara Govt. 2019. Available from: https://enetsud.org/2019/01/06/multi-billion-naira-ilorin-water-reticulation-project-waste-of-tax-payers-money-enetsud-to-kwara-govt/.

12. Ayanshola AM, Sule BF, Mandal K. Evaluation of Supply Variability of Household Water Use in Ilorin Metropolis, North Central Nigeria. *Sci Technol Arts Res J.* 2015; 4(2): 252-8.

13. Ibrahim RB, Toyobo EA, Adedotun SB, Yunus S. Evaluation of the Public Pipe-borne Water Supply in Ilorin West Local Government Area of Kwara State, Nigeria. *Econ Environ Stud.* 2020; 18 (3): 1105-18.

14. Ohwo O, Agusomu TD. Residential Customers Satisfaction with Public Water Provision in Ojota, Nigeria. *Eur Sci J.* 2018; 14(23): 117.

15. Tessema MM. Assessment of Customer's Satisfaction on Water Supply Service Deliveryin Bahir Dar City, Ethiopia. *Int J Adv Res Sci Eng Technol.* 2020; 06(10): 20-9.

16. Han S, Hwang H, Kim S, Baek G, Park J. Sustainable Water Infrastructure Asset Management: A Gap Analysis of Customer and Service Provider Perspectives. *Sustain.* 2015; 7(10): 13334-50.

17. Sualihu MA, Rahman MA, Tofik-Abu Z. The Payment Behavior of Water Utility Customers in the Greater Accra Region of Ghana: An Empirical Analysis. *SAGE Open.* 2017; 7(3): 2158244017731494.

18. Needham MD, Vaske JJ. Survey Research and Analysis: Applications in Parks, Recreation, and Human Dimensions. *Venture Publishing.* 2008; 208-12.

19. Dillman DA. Mail and Telephone Surveys: The Total Design Method. New York, Wiley. 1978.

20. Mokuolu OA, Adegboye DO, Mokuolu OA. The Impact of Environmental Factors on Malaria Prevalence in a Per-Urban Community in Kwara State, Nigeria. *Int J Public Health Sci.* 2014; 3(3): 173-8.

21. Ifabiyi I, Geoffrey EG, Salami A. Assessment of Water Accessibility and Quantity in Ilorin South Local Government Area. *Malays J Soc Space.* 2019; 15(3).

22. Bilewu SO, Salami AW, Ayanshola AM, Yusuf IT. Assessment of Noise from Transportation Systems in Ilorin Nigeria. *Nigeria J Technol Dev.* 2019; 16 (3): 98-104.

23. Yamane Taro. Statistics: An introductory Analysis, 2nd Edition, New York: Harper and Row. 1967.

24. Croasmun JT, Ostrom LT. Using Likert-Type Scales in the Social Sciences. *J Adult Educ.* 2011; 40: 19-22.

25. Daykin AR, Moffatt PG. Analyzing Ordered Responses: A Review of the Ordered Probit Model. *Underst Stat.* 2002; 1(3): 157-166.

26. Louangrath P. Reliability and Validity of Survey Scales. *Int J Soc Res Methodol.* 2018; 4(1): 50-62.

27. Kassa K, Chernet M, Kelemework G, Zewde B, Woldemedhin A. Customer Satisfaction Survey: The Case of Urban Water Supply Services in Southern Ethiopia. *Water Pract Technol.* 2017; 12(4): 1009-17.

28. Zeraebruk KN, Mayabi AO, Gathenya JM, Tsige Z. Assessment of Level and Quality of Water Supply Service Delivery for Development of Decision Support Tools: Case Study Asmara Water Supply. *Int J Sci Basic Appl Res.* 2014; 14: 93-107.