Program Implementation of Calbayog Water

MARY EMALAINE T. SERRANO
Calbayog City Water District (CCWD)
Calbayog City, Samar, Philippines, 6710
maryemalaineserrano@yahoo.com

Abstract — This study examines the implementation of water services at Calbayog Water, identifying existing issues and areas for improvement. Through community feedback and operational challenges, the research aims to formulate an action plan to enhance service delivery. A descriptive assessment research design was employed, with data collected through modified questionnaires distributed to Calbayog City Water District personnel using universal sampling and Slovin's formula for the concessionaires. The sample consisted of 27 employees and 473 concessionaires, totaling 500 respondents. The questionnaire assessed the degree of implementation of water services in customer service, billing & collection, and operations using a five-point rating scale. Statistical methods like mean and standard deviation were used to evaluate water service status, while a T-test analyzed the perceptions of concessionaires and personnel. Satisfaction survey results indicated a generally positive view of customer services, though areas for improvement, especially in responsiveness, communication, and transparency, were identified. Billing and collection services received strong ratings, but operations showed mixed satisfaction levels. Reconnection services were a weak point, with delays noted in its delivery. Calbayog Water's operations also received mixed satisfaction ratings from both concessionaires and employees. Among the problems reported by concessionaires, low water pressure/no water and inconsistent water availability were the most critical, followed by late service announcements, billing errors, and delayed bill delivery. Based on these results, Calbayog Water should improve responsiveness to concerns, expedite repair and restoration efforts, enhance communication, and address water supply inconsistencies to improve service quality and customer trust.

Keywords — Water, Water Services, Customer Service, Billing and Collection, Operations

I. Introduction

Water is an essential life force (Staddon, 2016) and a vital support system for human existence (Concepcion et al., 2015). It influences every aspect of development and connects with nearly every Sustainable Development Goal (SDG). Recognizing water as a driver of economic growth, a foundation for healthy ecosystems, and a necessity for life itself (Rozenberg, 2025), its critical role is undeniable, especially at the local level.

As recognized by United Nations (2019), safe, affordable, and reliable drinking water and sanitation services constitute a fundamental human right and are critical for human health, stable societies, sustainable development, and ecosystem integrity (World Meteorological Organization, n.d.). Potable water is defined as water that is free from disease-causing microorganisms and chemical substances harmful to health (Sunday et al., 2014). Drinking water, also known as

drinking water, comes from surface and groundwater sources (Potable Water - Water Education Foundation, 2020) and is treated to meet state and federal consumption standards (Tuser, 2022). Furthermore, water is vital to our existence, and its importance in our daily lives necessitates thorough physicochemical examinations of potable water sources (Harcourt et al., 2012).

Water demand has been increasing and continues to grow globally as the world population rises and nations become wealthier, leading to greater consumption (Wada et al., 2016). Global water demand is rising due to population growth, improved living standards, changing consumption patterns, and increased irrigation (Ercin & Hoekstra, 2014), placing additional pressure on traditional water supply systems (Price, J., Fielding, K. S., Gardner, J., Leviston, Z., Green, 2015) and leading to heightened and competing water demands across domestic, agricultural, and industrial sectors (Pearson, 2014).

The Un-Water and Un-Water (2023) predicts that domestic water demand will grow considerably from 2010 to 2050 in all regions globally; however, Western Europe is projected to be an exception. Africa and Asia are projected to witness the most substantial increase in domestic water demand, at 300%, while Central and South America will experience a 200% rise. The driving force behind the projected 300% increase in domestic water demand in Africa and Asia, and the 200% increase in Central and South America, is the expansion of water supply services to meet the needs of growing urban settlements (Wada et al., 2016). While global water scarcity is a concern, local situations often paint a far grimmer picture. With clean water demand rising and availability dwindling, many communities will face critical shortages long before a global crisis occurs (Boretti & Rosa, 2019).

In the Philippines, an estimated 100.7 million residents, representing 91% of the population, have access to at least basic water services. However, availability varies significantly by location, ranging from 62% to 100%. Only 80% of households in the poorest quintile have access to essential water services, compared to nearly 99% of the wealthiest one-fifth of households (UNICEF, 2017). Factors contributing to this disparity include weak planning, poor performance of water utilities, inadequate support for the urban poor, and challenges faced by rural water utilities face (Tansengco-Schapero et al., 2013).

Nine million Filipinos, out of a population of 101 million, are still burdened by unimproved, unsafe, and unsustainable water sources. The impact of inadequate and intermittent water supply is felt across the nation, from rural areas to low-income urban cities, and even within the bustling metropolis of Metro Manila (Palanca-Tan, 2020). For residents of Capual Island, Philippines, and other rural areas, the daily struggle for clean drinking water presents a significant health concern, as access remains limited (Warid-Sahial et al., 2024). Meanwhile, according to Manila Water (2024), as Calbayog City's population and water demand increased, the facility struggled to maintain its operations, leading to reduced water availability during peak hours. Therefore, water service providers need to ensure the reliability and continuity of water supply by providing consistent water availability to meet consumer needs (Gowela et al., 2017).

The purpose of this research was to determine the degree to which current water services offered by Calbayog Water had been implemented, based on various reports and comments gathered from social media and the water district office. To address this issue using the collected information, the researcher aimed to establish relevant findings as a basis for formulating a plan of action to improve the services of Calbayog Water.

Calbayog Water's ultimate aim was to provide effective and efficient services, which would benefit various stakeholders. The concessionaires were the primary recipients of this improved services program. The study's results will assure them of the merits and quality of these services. The assessment results may prompt Calbayog Water personnel to validate the quality of their services delivery. These findings could enhance personnel commitment to their responsibilities while striving to improve services for the concessionaires and the service area overall. The results could inspire their desire to excel by pursuing additional training and equipping themselves with the necessary knowledge, tools, and equipment. Furthermore, the study could provide the board of directors with accurate information on the quality of services, aiding in improving the necessary service contracts in areas where needed. Lastly, the findings of the study could be used as a basis for future research, allowing future researchers to explore other variables related to water services programs that were not included in this research.

Literature Review

Ajema (2019) defined customer service as a business term measuring how products and services supplied by a company meet or surpass customer expectations. It is the outcome of the customer's experience in meeting their needs or expectations (Asaduzzaman et al., 2013). Recognizing this, Kassa et al. (2017) concluded that service quality and customer satisfaction are crucial factors for water enterprises, requiring them to understand and measure these concepts through the customer's viewpoint to ensure satisfaction. Hence, the implementation of a customer-oriented organizational culture and management by providing exceptional service to customers is important (Coleman, 2015).

(Cooper & Schindler, 2014) defined customer orientation in customer service as salespeople's desire to: (1) facilitate satisfying purchases; (2) assess customer needs; (3) offer tailored services; (4) provide appropriate assistance; and (5) avoid manipulative tactics, prioritizing customer satisfaction over pressure. This accumulation is a driver of distribution performance. Some other factors are trust (Delozier, 2018), risk perception (Debbeler et al., 2018) and quality (Ajema, 2019). Furthermore, the study of Haming et al. (2019) showed that reliability, assurance, tangibles, empathy, and responsiveness are significant factors affecting the performance, leading to customer satisfaction.

The water billing system plays a crucial role in the operations of water utility companies, encompassing billing, payment, and customer information management. However, the traditional manual water billing system is highly time-consuming and prone to errors (Nithya et al., 2023).

According to Wayman (2018), many water utilities have been in the media for billing accuracy issues in the past year, including Phoenix, AZ, San Diego, CA, and Austin, TX. Manual meter reading is error-prone, and as utilities introduce new metering programs, the risk of issuing inaccurate bills and receiving unwanted customer attention increases. Once implemented, advanced metering infrastructure (AMI) provides granular detail on water consumption patterns and improves billing accuracy – but water utilities have also run into issues with these programs due to billing system errors during deployment.

In the study of Zaidi et al. (2018), a proposed water billing system demonstrated improved billing security and a significant reduction in fraudulent activities. It was done by leveraging the inherent security features of its blockchain, which is a powered system aimed to automate and secure billing process effectively. According to (Daimi et al., 2012), prepaid water meters are presently available with smart card technology, in which consumers spend the amount of water loaded from credit sales office by loading the credit.

Water is a complex good, and providing it requires understanding the different phases of supplying water and the various manners of delivery. From an economic perspective, the different steps in water provision transform water into different types of goods, consequently affecting its potential provision, management, or regulation. One of these is that a water source is a common resource that should be regulated across different users. Allowing unregulated use of the water source would lead to negative externalities in that an additional user would reduce the available supply for other users. This would therefore lead to overconsumption of the water source. The typical economic solution for this problem would be to have a regulatory body estimating and controlling the optimal number of users of this common resource (Stiglitz and Rosengard, 2015).

Thomas et al. (2017) and Yang et al. (2023) highlighted the significance of stakeholder perceptions, particularly in building trust. To foster community trust, active involvement in water supply projects was advocated, leading to improved implementation, sustainability, and maintenance. Maloba & Kihara (2019) found a positive relationship between customer care and technology strategies and the performance of Nairobi City Water and Sewerage Company (NCWSC). They recommended that NCWSC improve performance through strategies such as: enhancing response resolution services (Maji voice), reducing complaint resolution times, following up on resolved complaints, and regularly reviewing customer relationship management practices. Additionally, they suggested implementing enterprise resource planning, using technology for billing, promoting mobile payment services, and automating water dispensers.

II. Methodology

The study used the descriptive assessment research design. According to McCombes (2023), descriptive research aims to accurately and systematically characterize a population,

situation, or phenomenon. Before researching why something happened, a descriptive study is appropriate when a situation needs an understanding of what, when, and where problems occur.

The researcher divided the respondents into two different groups, composed of the personnel of Calbayog City Water District and the concessionaires of the water service coverage of Calbayog, to compare each group's perception. Universal sampling was used for the personnel of Calbayog City Water District, while the number of concessionaires was estimated using Slovin's Formula.

The study was conducted to assess the status of water services of Calbayog Water during the second semester of SY 2023-2024.

The researcher used universal sampling for the personnel of Calbayog City Water District, while the concessionaires were selected at random, and their number was estimated using Slovin's Formula. The respondents were composed of 27 personnel and 473 concessionaires, with a total of 500.

The modified questionnaire measured the degree of implementation of water services in terms of customer service, billing & collection, and operations of Calbayog Water, using a Likert-type scale with five options to assess the frequency of practices. The scale was designed as follows: 5 - Always Practiced (AP); 4 - Often Practiced (OfP); 3 - Sometimes Practiced (SP); 2 - Occasionally Practiced (OP); and 1 - Never Practiced (NP).

III. Results and Discussion

Age profile of the respondents

Table 6

Age profile of the respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	-	52	10.4	10.4	10.4
	18-29	67	13.4	13.4	23.8
	30-39	167	33.4	33.4	57.2
	40-49	67	13.4	13.4	70.6
	50-59	83	16.6	16.6	87.2
	60 & above	64	12.8	12.8	100.0
	Total	500	100.0	100.0	

As shown in Table 6, from the total of 500 respondents, 67 (13.4%) were in the age category of 18-29, 167 (33.4%) in the age category of 30-39, 67 (13.4%) in the age category of 40-49, 83 (16.6%) in the age category of 50-59, 64 (12.8%) in the age category of 60 & above and 52 (10.4%) did not disclose their age.

Sex profile of the respondents

Table 7

Sex profile of the respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	-	18	3.6	3.6	3.6
	Female	283	56.6	56.6	60.2
	Male	199	39.8	39.8	100.0
	Total	500	100.0	100.0	

As shown in Table 7, from the total of 500 respondents 283 (56.6%) were female, 199 (39.8%) were male and 18 (3.6%) did not disclose their sex identity. From these results, female respondents comprise the majority.

Income profile of the respondents

Table 8

Income profile of the respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	-	10	2.0	2.0	2.0
	Below ₱ 10,000.00	142	28.4	28.4	30.4
	₱ 10,000.00 - ₱20,000.00	123	24.6	24.6	55.0
	₱ 20,000.00 - ₱ 30,000.00	120	24.0	24.0	79.0
	Above ₱ 30,000.00	105	21.0	21.0	100.0
	Total	500	100.0	100.0	

As shown in Table 8, out of the 500 respondents, 142 (28.4%) have an income below ₱10,000.00, 123 (24.6%) earn between ₱10,000.00 and ₱20,000.00, 120 (24.0%) earn between ₱20,000.00 and ₱30,000.00, 105 (21.0%) have an income above ₱30,000.00, and 10 (2.0%) did not disclose their monthly income.

Classification of Service Connection

Table 9

Classification of Service Connection

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	-	6	1.2	1.2	1.2
	Residential	460	92.0	92.0	93.2
	Commercial	32	6.4	6.4	99.6
	Government	2	0.4	0.4	100.0
	Total	500	100.0	100.0	

As shown in Table 9, out of the 500 respondents, 460 (92.0%) fell under the residential classification, 32 (6.4%) were classified as commercial, 2 (0.4%) were classified as government, and 6 (1.2%) did not disclose their classification.

Educational Attainment of the Respondents

Table 10

Educational Attainment of the Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	-	8	1.6	1.6	1.6
	Elementary Undergraduate	14	2.8	2.8	4.4
	Elementary Graduate	41	8.2	8.2	12.6
	High School Undergraduate	28	5.6	5.6	18.2
	High School Graduate	37	7.4	7.4	25.6
	College Undergraduate	83	16.6	16.6	42.2
	College Graduate	278	55.6	55.6	97.8
	Post Baccalaureate Undergraduate	4	0.8	0.8	98.6
	Post Baccalaureate Graduate	7	1.4	1.4	100
	Total	500	100.0	100.0	

From Table 10, it can be seen that out of 500 respondents, 14 (2.8%) are elementary undergraduates, 41 (8.2%) are elementary graduates, 28 (5.6%) are high school undergraduates, 37 (7.4%) are high school graduates, 83 (16.6%) are college undergraduates, 278 (55.6%) are college graduates, 4 (0.8%) are post-baccalaureate undergraduates, and 7 (1.4%) are post-baccalaureate graduates.

Status of Water Services in Terms of Customer Service

Table 11

Concessionaires' and Personnel's Satisfaction with Customer Services

Criteria	N	Mean	Std. Deviation
Organized queuing system at the office	500	4.3	.90
The staff gives prompt responses to Customer inquiries and complaints	500	3.7	1.02
The staff strictly and fairly implemented the policies, rules, and regulations (e.g., no discrimination, no "palakasan" system)	500	4.0	.96
The staff provided clear and sufficient information, i.e., solutions to problems, answers to inquiries, and information services.	500	3.5	1.07
Demonstrates willingness to assist customers.	500	4.0	1.05

Legend: 5- Always Practiced (AP); 4-Often Practiced (OfP); 3-Sometimes Practiced (SP); 2-Occasionally Practiced (OP); 1-Never Practiced (NP)

The satisfaction survey results reveal a generally positive perception of customer services among concessionaires and personnel, though areas for improvement are evident. The organized queuing system (mean = 4.3) and the staff's willingness to assist customers (mean = 4.0) received the highest ratings, indicating strong satisfaction with organizational efficiency and customer-oriented behavior. However, prompt responses to inquiries and complaints (mean = 3.7) and the provision of clear and sufficient information (mean = 3.5) scored lower, suggesting delays in addressing concerns and a need for better communication. Additionally, while the fair

implementation of policies (mean = 4.0) was rated relatively high, the standard deviation (0.96) indicates variability in perceptions, possibly reflecting inconsistencies in policy enforcement.

Status of Water Services in Terms of Billing and Collection

Table 12

Concessionaires' and Personnels' Satisfaction with Billing and Collection Services

Criteria	N	Mean	Std. Deviation
The distribution of the water bill in your area is on time.	500	4.3262	0.84109
Provides invoices to Customers which clearly identify services, charges, period covered, forms of payment and penalties for late or non-payment	500	4.442	0.78732
Provides accurate billing.	500	4.412	0.81214
Prompt reconnection of disconnected water meter.	500	3.764	1.02294
Delivers water bill to the correct recipient	500	4.52	0.77641

Legend: 5- Always Practiced (AP); 4-Often Practiced (OfP); 3-Sometimes Practiced (SP); 2-Occasionally Practiced (OP); 1-Never Practiced (NP)

The satisfaction survey results for billing and collection services indicate a high level of satisfaction among concessionaires and personnel, with most criteria receiving strong ratings. The timely distribution of water bills (mean = 4.33), clear and detailed invoices (mean = 4.44), accurate billing (mean = 4.41), and correct delivery of bills to recipients (mean = 4.52) demonstrate efficient and transparent billing practices. However, the prompt reconnection of disconnected water meters (mean = 3.76) scored lower, suggesting delays in reconnection services that may inconvenience customers. The high standard deviation for this criterion (1.02) further highlights variability in service delivery.

Status of Water Services in Terms of Operation

Table 13

Concessionaires' and Personnel's Satisfaction with Operation (Maintenance and Repair Services)

Criteria	N	Mean	Std. Deviation
Give notices to Customers at least 48 hours in advance of any planned interruptions in water supply, except in unforeseen circumstances.	500	3.0660	1.01967
Urgent restorations of water supplies for any unplanned interruptions in service.	500	3.3280	.92852
Request for service line leak repair was fixed appropriately and quickly.	500	3.0920	.95570
Informs Customers on progress in making necessary repairs.	500	3.4400	.98404
Immediate restoration of concrete roads after leak repairs.	500	2.9340	.94203
Intensify advocacy on storing water for emergency use.	500	3.5720	.99740
The water in your area is available throughout the day.	500	3.5280	1.54985
The water supply in your area has strong pressure.	500	3.1980	1.37206
The water supply is clean and clear -e.g., no foreign body can be seen.	500	4.4500	.92586
The water has no nasty taste.	500	4.4800	.91831
The water has no unpleasant odor/smell.	500	4.5040	.90975

Legend: 5- Always Practiced (AP); 4-Often Practiced (OfP); 3-Sometimes Practiced (SP); 2-Occasionally Practiced (OP); 1-Never Practiced (NP)

The survey results for operation (maintenance and repair services) reveal mixed levels of satisfaction among concessionaires and personnel. While certain aspects, such as water clarity (mean = 4.45)**,** potability (mean = 4.48)**,** and absence of unpleasant odor (mean = 4.50)**,** received high ratings, indicating satisfaction with water quality, other areas scored significantly lower. Issues such as late announcements for water interruptions (mean = 3.07)**,** prompt repair of reported leakages (mean = 3.09)**,** immediate restoration of concrete roads (mean = 2.93)**,** and strong water pressure (mean = 3.20**)** highlight inefficiencies in communication, service delivery, and infrastructure restoration. These lower scores, coupled with high standard deviations (e.g., 1.37 for strong water pressure), suggest inconsistencies in service performance and a need for more timely and reliable responses to customer concerns.

Problems Met by the Concessioanires of the Water Services

Table 14

Problems met by the concessionaires of the water services in Calbayog City

Rank	Problem Description	Personnel's Average Rank	Concessionaires' Average Rank
1	P6. Low pressure to no water	1.5	1.7
2	P7. Water not available throughout the day	2.0	2.2
3	P1. Late announcement for water interruption	2.5	2.8
4	P2. Erroneous Billing	3.0	3.1
5	P3. Late distribution/delivery of water bill	3.5	3.4
6	P8. Late repair of reported leakages	4.0	4.2
7	P5. Unrestored concrete roads	4.5	4.6
8	P4. Late reconnection of water meter	5.0	5.1
9	P9. Open pit. Unfinished works/repair	6.0	6.2
10	P10. The water is not clear/foreign body or dirt can be seen	7.0	7.1

The survey results indicate that low water pressure or no water (P6) and inconsistent water availability throughout the day (P7) are the most critical issues faced by both personnel and concessionaires, with average ranks of 1.5 and 2.0 for personnel and 1.7 and 2.2 for concessionaires, respectively. These water supply problems significantly impact daily operations and customer satisfaction. Following closely are administrative issues such as late announcements for water interruptions (P1), erroneous billing (P2), and late delivery of water bills (P3), which also rank highly for both groups. Notably, personnel tend to rate water supply issues slightly higher than concessionaires, suggesting that personnel may be more directly affected by these problems in their day-to-day work. Less severe but still notable are problems like late repair of leakages (P8) and unrestored concrete roads (P5), which affect infrastructure and service quality. The least concerning issues are unfinished repair works (P9) and water clarity (P10), suggesting that while these are present, they are not as pressing as water supply and administrative challenges. Overall, the data highlights a need for improved water distribution systems, timely communication, and better administrative processes to address the top-ranked problems effectively.

Respondents' Perception of Customer Service

Table 15

Independent Samples t-Test of Concessionaires' and Personnel's Satisfaction with Customers Services

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Responses	Equal variances assumed	.676	.411	4.862	498	.000	.79027	.16255	.47091	1.10964
	Equal variances not assumed.			4.897	29.099	.000	.79027	.16138	.46027	1.12028

The data reveals that concessionaires generally rate customer service higher than personnel, with statistically significant variation in their responses. Key aspects such as organized queuing systems (WSP1), prompt responses to inquiries and complaints (WSP2), fair implementation of policies (WSP3), and clear and sufficient information provided by staff (WSP4) are perceived more positively by concessionaires. However, both groups show room for improvement in areas like demonstrating willingness to assist customers (WSP5), which received slightly lower scores. While concessionaires report higher overall satisfaction with customer service, the data highlights specific areas requiring improvement. To ensure consistent, high-quality service for all, particularly regarding personnel concerns, targeted enhancements to customer service practices are necessary.

Respondents' Perception with Billing and Collection

Table 16

Independent Samples t-Test of Concessionaires' and Personnel's Satisfaction with Billing and Collection Services

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Responses	Equal variances assumed	.793	.374	.042	498	.967	.00583	.13889	-.26706	.27871
	Equal variances not assumed			.040	28.712	.968	.00583	.14614	-.29320	.30485

An independent samples t-test was undertaken to identify the difference between the responses of two groups (e.g., personnel and concessionaires) regarding their satisfaction with billing and collection services for water services. Levene's Test for Equality of Variances showed an F-value of 0.793 with a significance level of 0.374, indicating that the assumption of equal variances was met ($p > 0.05$). The t-test results showed a t-value of 0.042 with 498 degrees of freedom and a p-value of 0.967, which is not statistically significant ($p > 0.05$). As the p-value (0.967) is larger than the established significance level of 0.05, we retain the null hypothesis, leading to the conclusion that there is no significant difference in the perception between the two groups of respondents on the quality of services with regard to billing and collection. The mean difference of 0.00583 further supports this conclusion, as the 95% confidence interval for the difference (-0.26706 to 0.27871) includes zero, indicating that the true difference between the groups is likely negligible.

The data reveals that both personnel and concessionaires generally rate billing and collection services similarly, with no statistically significant variation in their responses. Key aspects such as timely distribution of water bills, accuracy of billing, clarity of invoices, and prompt reconnection of disconnected water meters are perceived uniformly across both groups. This suggests that the billing and collection processes are consistently experienced by both personnel and concessionaires, with neither group expressing significantly higher or lower satisfaction levels. However, the relatively high ratings (averaging around 4-5 on a 5-point scale) indicate overall satisfaction with these services, though there is room for improvement in areas like prompt reconnection of water meters, which received slightly lower scores.

In conclusion, the results highlight that billing and collection services are generally well-received, but efforts to enhance efficiency, particularly in reconnection processes, could further improve customer satisfaction across both groups.

Respondents' Perception with Operation

Table 17

Independent Samples t-Test of Concessionaires' and Personnel's Satisfaction with Operation (Maintenance and Repair) Services

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
RESPONSES	Equal variances assumed	4.229	.040	.122	358	.903	.01993	.16281	-.30025	.34011
	Equal variances not assumed			.163	34.863	.872	.01993	.12254	-.22888	.26874

The independent samples t-test was performed to compare the satisfaction responses of concessionaires and personnel regarding Operation (Maintenance & Repair) services. Levene's Test for Equality of Variances showed an F-value of 4.229 with a significance level of 0.040, indicating that the assumption of equal variances was not met ($p < 0.05$). The t-test results, using the equal variances not assumed condition, showed a t-value of 0.163 with 34.863 degrees of freedom and a p-value of 0.872, which is not statistically significant ($p > 0.05$). As the p-value (0.872) is larger than the alpha level of 0.05, we retain the null hypothesis, leading to the conclusion that there is no significant difference in the perception between the two groups of respondents on the quality of services with regard to operations. The mean difference of 0.01993 further supports this conclusion, as the 95% confidence interval for the difference (-0.22888 to 0.26874) includes zero, indicating that the true difference between the groups is likely negligible.

The data reveals that both groups generally rate maintenance and repair services similarly, with no statistically significant variation in their responses. Key aspects such as advance notice of water interruptions, urgent restoration of water supply, quick and appropriate leak repairs, and clean and clear water supply are perceived uniformly across both groups. However, the relatively lower scores for immediate restoration of concrete roads after repairs and intensified advocacy on storing water for emergencies suggest areas for improvement. Overall, the results highlight that both concessionaires and personnel are generally satisfied with maintenance and repair services, but there is room for enhancing specific areas to further improve service quality and customer satisfaction.

Discussion

The study's demographic analysis revealed a respondent pool spanning 18 to 85 years (mean: 42), with a female majority (56.6%). Most respondents reported monthly incomes between ₱10,000 and ₱20,000, were residential customers, and held college degrees. Satisfaction assessments showed positive perceptions for customer service and billing across both concessionaires and personnel. However, operational issues, including low water pressure and inconsistent supply, were frequently cited as critical concerns. Statistical analysis revealed a significant difference in customer service satisfaction between the two groups, but no significant differences regarding billing and operational satisfaction.

IV. Conclusion

1. The analysis revealed that low water pressure or no water (P6) and inconsistent water availability throughout the day (P7) significantly impact daily operations and customer satisfaction. Additionally, administrative issues such as late announcements for water interruptions (P1), erroneous billing (P2), and late delivery of water bills (P3) also rank highly for both groups. This result implies that improving water pressure consistency and providing timely notifications regarding interruptions, as emphasized by the World Health Organization (2023) and the United Nations (n.d.), are critical for maintaining customer satisfaction and trust. The study further suggests that proactive management, including timely billing and transparent communication, can mitigate dissatisfaction caused by administrative issues, aligning with recommendations from the Asian Development Bank (2021) and Nithya et al. (2023). Incorporating advanced metering and automated systems could reduce billing errors and improve customer experience, as supported by studies on the benefits of digital payment solutions and Advanced Metering Infrastructure (AMI) (VertexOne, 2021; Muni-link, 2024).

2. The results reveal mixed satisfaction levels regarding operation and maintenance services, with inefficiencies in communication and delayed responses to water interruptions, bill distribution, road repairs, and leak fixes. These issues point to inconsistencies in service performance and highlight the need for more timely, reliable responses. These results are in agreement with the literature, which stresses the importance of efficient maintenance in ensuring safe, consistent water supply (Pradhikaran, 2012; WHO, 2023). Technology, such as mobile leak detection and notifications, can improve service efficiency and customer satisfaction (Maloba & Kihara, 2019; Cheung, 2024). Addressing these inefficiencies could enhance overall service reliability and customer trust.

3. The result indicating that prompt reconnection of disconnected water meters scored lower suggests delays in reconnection services, potentially leading to customer inconvenience. This inefficiency aligns with findings in the literature on the importance of quick response times in customer service, as delays can significantly impact customer satisfaction and loyalty (ASQ, n.d.; Doxee, 2019). Studies emphasize that effective customer service, including prompt issue

resolution, contributes to improved customer retention and overall satisfaction (Perez, 2022; Ellis, 2023). Delays in reconnection may also undermine customers' trust in the utility's ability to manage disruptions, highlighting the need for timely service delivery to maintain positive customer relationships.

4. The result showing that unfinished repairs and water clarity are less concerning suggests that customers prioritize water supply and administrative issues over these factors. This supports the literature, which highlights that reliable water service and efficient billing are key to customer satisfaction (Cheung, 2024; Sualihu & Rahman, 2014). While maintenance and water clarity are important, customers tend to tolerate these as long as core services are consistent. Balancing both minor and major issues is essential for maintaining positive customer perceptions (World Health Organization, 2023).

5. The significant difference in satisfaction levels between concessionaires and personnel regarding customer service highlights the importance of tailoring service delivery to meet the expectations of different stakeholders. This aligns with studies emphasizing the need for customer-oriented service strategies and the role of customer satisfaction in fostering loyalty and retention (Grant, 2024; Heath, 2024). However, the lack of significant difference in responses regarding billing & collection and operations suggests that both groups have similar concerns about these aspects, reinforcing the idea that reliable, efficient billing and operational services are universally important (Silverblaze, 2023; World Bank Group, n.d.).

6. The respondents' age range of 18 to 85 years, with an average age of 42, suggests a broad demographic spectrum with a likely mix of both younger and older consumers. This aligns with the importance of addressing the needs of various age groups in customer service strategies, as different generations may have varying expectations of service quality and delivery (Grant, 2024; ASQ, n.d.). With females comprising 56.6% of respondents, it is crucial to consider their specific communication preferences, as research demonstrates the importance of understanding female customer needs for effective service delivery (Queensland Government, 2023). The income range of ₱10,000.00 - ₱20,000.00 indicates a middle-income bracket, which may imply a focus on affordability and value in customer satisfaction (Cheung, 2024). Additionally, the majority being under the residential service classification and college graduates suggests an educated customer base that may expect efficient, transparent, and accessible services, reinforcing the need for clear communication and reliable billing systems (Doxee, 2019; Muni-link, 2024).

REFERENCES

[1] Ajema, S. (2019). SCHOOL OF GRADUATE STUDIES DETERMINANT OF FACTORS AFFECTING CUSTOMER SATISFACTION OF BOTTLED WATER IN ETHIOPIA IN THE CASE OF ORIGIN NATURAL MINERAL WATER ADDIS ABABA ETHIOPIA. http://repository.smuc.edu.et/bitstream/123456789/5125/1/Thesis final .pdf
[2] Boretti, A., & Rosa, L. (2019). Reassessing the projections of the World Water Development Report. Npj Clean Water, 2(1). https://doi.org/10.1038/s41545-019-0039-9
[3] Coleman, L. B. S. (2015). The customer-driven organization: Employing the Kano model (1st ed.). CRC Press. https://doi.org/https://doi.org/10.1201/b17815
[4] Concepcion, C. J. L., Estomata, D. W. L., Raganas, J. C., & Segovia, H. M. E. (2015). RAINWATER TREATMENT SYSTEM Christine Joy L. Concepcion, Danica Wyn L. Estomata, Janice C. Raganas, Harly Me. E. Segovia, and Rudevalio Odruña. 4, 33–56. https://ejournals.ph/article.php?id=12866
[5] Cooper, D., & Schindler, P. (2014). Business Research Methods (12th ed.). McGraw-Hill Education.
[6] Daimi, S. S., Santosh, M., & Rehman, U. (2012). Design and Development of GSM based Energy Meter. International Journal of Computer Applications, 47(12), 41–45. https://doi.org/10.5120/7244-0302
[7] Debbeler, L. J., Gamp, M., Blumenschein, M., Keim, D., & Renner, B. (2018). Polarized but illusory beliefs about tap and bottled water: A product- and consumer-oriented survey and blind tasting experiment. Science of the Total Environment, 643, 1400–1410. https://doi.org/10.1016/j.scitotenv.2018.06.190
[8] Delozier, J. (2018). Boundary spanners and trust development between stakeholders in integrated water resource management: A mixed methods study.
[9] Ercin, A. E., & Hoekstra, A. Y. (2014). Water footprint scenarios for 2050: A global analysis. Environment International, 64(2014), 71–82. https://doi.org/10.1016/j.envint.2013.11.019
[10] Gowela, J. J., Alleyne, T., & Chinopfukutwa, G. L. (2017). Service quality gap analysis to improve public water service delivery in Lilongwe city : tapping customer ' s voice. Journal of Environment and Earth Science, 7(4), 12. http://iiste.org/Journals/index.php/JEES/article/view/36513
[11] Haming, M., Murdifin, I., Zulfikar Syaiful, A., & Putra, A. H. P. K. (2019). The application of SERVQUAL distribution in measuring customer satisfaction of retails company. Journal of Distribution Science, 17(2), 25–31. https://doi.org/10.15722/jds.17.02.201902.25
[12] Harcourt, P., Harcourt, P., Harcourt, C. P., Appl, A., & Res, S. (2012). Heavy metal levels and physico-chemical parameters of potable water in. 4(5), 2094–2097.
[13] Kassa, K., Chernet, M., Kelemework, G., Zewde, B., & Woldemedhin, A. (2017). Customer satisfaction survey: The case of urban water supply services in Southern Ethiopia. Water Practice and Technology, 12(4), 1009–1017. https://doi.org/10.2166/wpt.2017.105
[14] Maloba, W. J., & Kihara, A. (2019). International Journal of Strategic Management &Marketing.
[15] Manila Water. (2024). Calbayog Water commences key infrastructure projects to enhance water supply in Calbayog City. Manila Water Care in Every Drop. https://www.manilawater.com/news/calbayog-water-commences-key-infrastructure-projects-to-enhance-water-supply-in-calbayog-city
[16] Nithya, K., Sree, N. K., Nivas, P., Pallavi, K., K, S. P., Bindhu, P., & Sabyasachi, P. (2023).

[17] Palanca-Tan, R. (2020). Global Water Shortages: A Philippines Case Study. The Journal of Social, Political, and Economic Studies, 45(1–2), 46–62. https://www.researchgate.net/publication/349233406_Global_Water_Shortages_A_Philippines_Case_Study
[18] Pearson, R. (2014). The Journal of Social, Political and Economic Studies, 39(4)
[19] Pradhikaran, M. J. (2012). Module 2 Operation and Maintenance of Water Supply System: Training Module for Local Water and Sanitation Management. Maharashtra Jeevan Pradhikaran, CEPT University. https://www.pas.org.in/Portal/document/ResourcesFiles/pdfs/Module_2 Operation_maintenance of water supply system.pdf
[20] Price, J., Fielding, K. S., Gardner, J., Leviston, Z., Green, M. (2015). Water Resources Research. JAWRA Journal of the American Water Resources Association, 5(3), 2–2. https://doi.org/10.1111/j.1752-1688.1969.tb04897.x
[21] Rozenberg, S. H. J. R. J. (2025). Water. World Bank Group.
[22] Sualihu, M. A., & Rahman, M. A. (2014). Payment Behaviour of Electricity Consumers: Evidence from the Greater Accra Region of Ghana. Global Business Review, 15(3), 477–492. https://doi.org/10.1177/0972150914535135
[23] Sunday, J. J., Spencer, N. C. O., Kingsley, O., Edet, A. O., & Amaka, D. D. (2014). Original Research Article Physico-chemical and microbiological properties of water samples used for domestic purposes in Okada town , Edo state , Nigeria. Int.J.Curr.Microbiol.App.Sci., 3(6), 886–894.
[24] Tansengco-Schapero, S., Frauendorfer, R., Klaveren, P. Van, Tan, N., & Bolt, R. (2013). Philippines: Water Supply and Sanitation Sector Assessment, Strategy, and Road Map. In Proceedings of the DASIA 2006 : Data Systems in Aerospace.
[25] Thomas, M., Pidgeon, N., Evensen, D., Partridge, T., Hasell, A., Enders, C., Herr Harthorn, B., &
[26] Tuser, C. (2022). What is Potable Water. WasteWater Digest. https://www.wwdmag.com/what-is-articles/article/10940236/what-is-potable-water
[27] United Nations. (2019). UN World Water Development Report 2019: Leaving No One Behind. Retrieved from UN Water. https://www.unesco.org/en/wwap/wwdr/2019
[28] Wada, Y., Flörke, M., Hanasaki, N., Eisner, S., Fischer, G., Tramberend, S., Satoh, Y., Van Vliet, M. T. H., Yillia, P., Ringler, C., Burek, P., & Wiberg, D. (2016). Modeling global water use for the 21st century: The Water Futures and Solutions (WFaS) initiative and its approaches. Geoscientific Model Development, 9(1), 175–222. https://doi.org/10.5194/gmd-9-175-2016
[29] Warid-Sahial, A. P., Hayudini, M. A. A., Gadong, R. J., Ujad, R. J., Warid, L. P., Hussin, B. A.,
[30] World Health Organization, U. N. Ch. F. (2017). Safely managed drinking water - thematic report on drinking water 2017. World Health Organization. https://data.unicef.org/wp-content/uploads/2017/03/safely-managed-drinking-water-JMP-2017-1.pdf
[31] Yang, E., Butcher, D. A., Edwards, M. A., & Faust, K. M. (2023). Exploring the relationship between public trust toward the water sector and the use of bottled water within US shrinking cities.

IJAMS
INTERNATIONAL JOURNAL OF ADVANCED MULTIDISCIPLINARY STUDIES
Volume V, Issue 5 May 2025, eISSN: 2799-0664

Strategic Intervention "Project Sigla" And The Performance Of Grade 12 Students In Health Optimizing Physical Education

SHARMAINE P. AVILLA
Teacher II
Buenaventura Alandy National High School
Division of Tayabas City
Quezon Province

EDILBERTO Z. ANDAL, Ed.D.
edilberto.andal@lspu.edu.ph

Abstract — The study was conducted to assess the readiness of Grade 12 Humanities and Social Sciences (HUMMS) Students in college: Ex-post Facto on Performance, Career-Goal and Potential Challenges. Specifically, it attempted to scrutinize the academic performance of the respondents for the first quarter of SY 2021- 2022; construct the respondents' profile in their career goals; inquire from the respondents their potential challenges/ problems when they go to college; and come up with a proposed career plan for the respondents based on the findings of the study.
Results revealed that 9.87, 24.69, 39.50, 23.45, and 2.47 percent of the respondents belonged to the 90-100, 85-89, 80-84, 75 to 79 and below 75 grade scales, respectively. The most favored chosen career/ profession was 'Professional Teacher', with 22.2 percent of the class opted for it, followed by 'Criminologist' with 14.28 percent. 'Computer Programmer', 'Agriculturist', 'Musician', and 'Police officer' were the least chosen career/ profession. In the first ranking category of unknown/ potential challenges twelve were enumerated, topped by 'Financial difficulties' and 'Might find much difficulty in Math and Science', each obtaining a score of 18.5 percent. This was followed by 'Prolonged sickness in the family and Might not pass the college admission test', with a score of 11.1 percent each.
In the proposed career plan the following were suggested: (a) Only nine to ten percent of the respondents would take up any engineering degrees and computer science. (b) Twenty-four to twenty-five percent of the class may be advised to take up science-laden courses, (c) Thirty-nine to forty percent of the respondents may be encouraged to become a professional teacher, seaman, criminologist, police officer, or related college degree that do not deal so much mathematics and sciences. (d) Twenty-three to twenty four percent of the class may be persuaded to go for entrepreneurship or TESDA-certified livelihood course, and (e) Two to three percent of the class may be convinced to change their curriculum exit to employment.

Keywords — Readiness; HUMSS Students; Ex-post-Facto; Performance; Career Goal; Potential Challenges

V. Introduction

The