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Original Research

THE EFFECT OF WATER INFORMATION SYSTEM ON ENHANCING CUSTOMER SERVICE DELIVERY

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Abstract

The study has evaluated the effect of MajIS on enhancing customer service delivery by water and sanitation authority in Arusha city. The study used a descriptive research design and a mixedmethod approach. The sample size was 113. Quantitative data was collected through a questionnaire, and qualitative data was collected through an interview guide. Probability and nonprobability sampling techniques were used. Descriptive statistics and Pearson correlation analysis were used to analyse quantitative data, and content analysis for qualitative data. The results revealed and concluded that MajIS significantly affects the accessibility, quantity, quality, and reliability of water and sanitation services. Additionally, there is a moderate positive linear relationship between the level of customer service delivery and accessibility, availability, quality, and reliability of water and sanitation services. This study recommends that AUWSA integrate the MajIS with its customers to allow direct interaction and two-way communication to improve customer service delivery.

Keywords: water information system, MajIS, customer service, accessibility, quantity, quality, reliability.

1.0 INTRODUCTION

The growth and adoption of Information Communications Technology (ICT) is shifting the landscape of developing countries (GSMA Intelligence, 2013). The 21st century has been well-defined by swift technological change, where innovation is at the heart of competition to meet customers' needs more efficiently and sustainably (Brettel, et al., 2014). Additionally, the COVID-19 epidemic placed companies worldwide under additional pressure to adopt ICT as a strategy for survival (Guo, et al., 2020).

The evidence from Mexico demonstrates that the adoption of Information and Communication Technology (ICT) has a positive impact on innovation within firms (Khalifa, 2022). This impact is further enhanced by the role of ICT in knowledge management, which facilitates improved

integration between companies and customers (Panir et al., 2018). It is also important to note that the effects of ICT adoption on productivity are largely heterogeneous and depend on organisational capital and management practices (Brambilla & Tortarolo, 2018). In this regard, Water management systems, like other existing ICT systems, have been a common practice in a globalised world characterised by massive technological innovation where different countries utilise the system for proper management of the services offered.

An experience from a survey of 170 companies in Australia to examine the impact of customer relationship characteristics on profitable lifetime duration established that better understanding of customers along with co-creation of value with them requires cross-functional integration of processes, operations, people, as well as marketing capabilities through the use of ICT (Buttle, 2016). Nevertheless, the setting and context of the study differ considerably from those prevailing in water and sanitation authorities in Tanzania, whereby the water utilities information system was launched in 2017 (Ngonyani, 2019).

The Chinese experience offers the practice of establishing stringent water management systems, which have been associated with sustainable water resource utilisation (He et al., 2021). Effective service-centric asset management is crucial for water companies to prioritise customer satisfaction (Amaral et al., 2016). Smart Water Management Systems play a vital role in efficiently handling water distribution, recycling, control, monitoring, and leakage detection, thereby impacting customer service (Gade, 2021). Furthermore, improving customer service has been found to be effective in satisfying customers' desire for water levels of service (Han et al., 2015).

In the UK, water management systems use cloud computing to store, process, and analyze large volumes of data more efficiently. This practice has facilitated the development of more sophisticated analytics and reporting tools. The UK Water Resources Portal, which was elaborated on by Barker et al. (2022), is an example of a tool that provides dynamic and interactive access to water-related data across the UK. The system enables users to access and analyze water resource data from various sources, supporting more holistic water resource management decisions.

The impact of Information and Communication Technology (ICT) on water management systems in Africa has been a subject of empirical investigation. Studies have shown that ICT adoption is crucial in enhancing innovativeness, particularly in utilising Artificial Intelligence in water management systems such as sensor management systems at Nairobi City Water and Sewerage Company. This demonstrates the adoption of advanced technologies in water management (Kibet & Mutuku, 2023).

The World Bank's Water and Sanitation Programme (WSP) underscores a common practical



challenge in water management across various countries like Kenya, Tanzania, Uganda, Benin, Senegal, Liberia, and Niger. A study was conducted to explore the potential of ICT in enhancing water and sanitation services in these countries. The study revealed several primary barriers to the effective use of ICT in WASH (water, sanitation, and hygiene) service delivery (Ndaw, 2015).

In the context of Tanzania, the government, through the Energy and Water Utilities Regulatory Authority (EWURA), launched the Water Utilities Information System (MajIS) in 2017, intending to improve governance and water utilities service delivery through the water and sanitation authorities in the country (Ngonyani, 2019). However, there is little information on whether the usage of the newly introduced MajIS has led to positive results regarding water utility customer service delivery in Tanzania. Various studies on the use of ICT in water management conducted by the Water and Sanitation Programme (WSP) of the World Bank identified several challenges facing the implementation of ICT in the water, sanitation, and hygiene (WASH) sector. The challenges include weak national ICT frameworks, a lack of implementation strategies, weak financial models, and a lack of monitoring and evaluation, which are the main barriers to the effective use of ICT in the delivery of effective WASH customer services (Ndaw, 2015).

Although there is an extensive knowledge base on the usage of ICTs for various development sectors, little is known regarding the effects of ICT on enhancing customer service delivery by water and sanitation authorities in Tanzania. The study, therefore, intends to assess the impact of the novel water utilities information system (MajIS) applicable to enhancing service delivery by water and sanitation authorities in Tanzania through the case of the Arusha Urban Water and Sanitation Authority (AUWSA).

2.0 OBJECTIVE OF THE STUDY

The objective of this study is to evaluate the effects of water information systems on enhancing service delivery within the context of AUWSA.

3.0 LITERATURE REVIEW

In this section, the researcher intends to review and discuss literature discussion based on the theoretical and empirical literature reviews as illuminated below.

3.1 Theoretical Literature Review

This study intends to examine the effects of the water information system on enhancing service delivery within the context of AUWSA, and the researcher employed the SERVQUAL model as the best fit for this study. The SERVQUAL model, founded in the 1980s by Parasuraman, Valarie

Zeithaml, and Leonard Berry, is a quantitative tool that measures and assesses service quality by capturing user perceptions across dimensions like tangibility, reliability, responsiveness, assurance, empathy, and economy (Gu et al., 2022). This model, with its structured approach, allows for the identification of service defects and improvement directions, making it valuable for enhancing service quality in various industries, including water services.

The SERVQUAL model is based on the assumption that service quality is a measure of how well the service level delivered matches customer expectations. It posits that customers evaluate the quality of service based on the dimensions of tangibles, reliability, responsiveness, assurance, and empathy (Pawitra & Tan, 2003; Song et al.,2009). One of the main strengths of the SERVQUAL model is its ability to provide a clear and structured approach to measuring service quality from the customer's perspective, which can help organisations identify areas for improvement (Pawitra & Tan, 2003; Song et al.,2009). However, the SERVQUAL model has been criticised for its potential subjectivity, as customer expectations and perceptions can be highly individual and may not be fully captured by the model (Pawitra & Tan, 2003; Song et al.,2009).

Through the highlighted indicators of the model, such as tangibility, reliability, responsiveness, assurance, and empathy, the SERVQUAL model can be used to evaluate the effect of a Water Information System at AUWSA by assessing whether the system improves the tangibles, reliability, responsiveness, assurance, and empathy dimensions of service quality from the perspective of water service users (Pawitra & Tan, 2003; Song et al.,2009).

The SERVQUAL model's dimensions are aligned with these topical issues in this study as follows:

Accessibility: This is related to the 'tangibles' dimension, which involves the physical facilities and equipment.

Quality of Service: This directly relates to all five dimensions of the SERVQUAL model, as each dimension contributes to the overall perception of service quality.

Quantity: Although it is not directly addressed by the SERVQUAL model, quantity could influence perceptions of reliability and responsiveness.

Reliability: This is one of the core dimensions of the SERVQUAL model and pertains to the ability to perform the promised service dependably and accurately (Pawitra & Tan, 2003; Song et al.,2009).

In the context of evaluating the Effect of Water Information System on Enhancing Service Delivery, the SERVQUAL model is useful in assessing accessibility, quality, quantity, and reliability aspects of water services, aligning with the study's focus on service enhancement (Gu et



al., 2022).

3.2 Empirical Literature Review

3.2.1. Accessibility of Service

The study by Obiero et al. (2019) aimed to assess household access to groundwater in the Gilgil Constituency. The methodology employed in this study involved the use of Geographic Information Systems (GIS) to analyse and monitor water resources management. The findings highlighted the importance of effective water management strategies in addressing persistent water accessibility. The study's implications suggest that GIS can be a valuable tool for enhancing water resource management and ensuring sustainable access to groundwater.

Another study by Agensi et al. (2019) aimed to investigate the contamination potentials of household water handling and storage practices in Kirundo Sub-county, Kisoro District, Uganda. The methodology included research support and analysis of water quality, sanitation, and drinking water sources. The findings indicated a strong correlation between microbiological water quality and water source sanitation, emphasising the significance of protected water sources and accessibility. The implications suggest the need for improved sanitation practices to ensure safe drinking water access.

Furthermore, the study by Tussupova et al. (2016) focused on access to drinking water and sanitation in rural Kazakhstan. The aim was to understand the current situation of water access and sanitation services and assess the community's willingness to accept new systems. The methodology involved surveys and data analysis to evaluate access levels and community perceptions. The findings emphasised the importance of community acceptance in implementing new water supply projects. The implications highlight the necessity of considering community preferences and perceptions in developing sustainable water access solutions.

Lastly, the study by Nanle et al. (2022) examined residents' water accessibility in informal settlements of Jos Metropolis, Nigeria. The aim was to identify factors influencing water access sustainability. The methodology included respondent surveys and geographical analysis to assess water accessibility barriers. The findings revealed significant negative effects of cost, physical distance, and queuing on residents' water access. The implications underscore the need to address cost barriers and improve infrastructure to enhance water accessibility in informal settlements.

3.2.2. Service Quality

In Indonesia, Pairunan et al. (2017) conducted a study on information system water quality testing that, among other things, illuminated the concepts of information system and service quality in water service. The study employed a time series analysis, which found that information systems help in collecting, storing, and analyzing water quality data, which makes it easier to monitor and assess the quality of water more efficiently and accurately. Furthermore, the systems allow for the comparison of water quality parameters against national standards, such as the Indonesian National Standard (SNI), ensuring that water meets safety and quality requirements.

The role of information systems in water management is crucial for enhancing service quality. By utilizing modern technologies, such as integrated organization of information flows and decision-making procedures, water use efficiency can be improved, leading to better service quality in water management.

In another study by Muthwa (2021), the researcher aimed to explore how satisfied the community in the uMgungundlovu district municipality is with the water service provision and to design a framework that includes an aspect of information system through modern meter reading and usage statements to enhance water quality services. Through the use of a mixed-methods approach, data were collected qualitatively through interviews with twenty-four respondents and quantitative data through questionnaires from 286 respondents in the uMgungundlovu district municipality. The study revealed a gap in the water service quality provided by the uMgungundlovu district municipality in terms of what customers perceive and what they experience across all five dimensions of service quality. The study suggested that the uMgungundlovu district municipality should restructure its customer care service, update and upgrade water equipment, and modernise the water metre reading and statement systems through the information system to enhance water service quality.

Apart from the above studies, Molinos-Senante et al. (2022) shed light on water services. Their study aimed to create a new way to measure how well water companies are doing in providing good service, focusing on drinking water and wastewater treatment. In this study, researchers used a two-step process involving a non-compliance index and a goal programming approach to evaluate water companies based on essential service indicators. They found that 37.5% of water companies did not meet the basic requirements for providing essential water services, and only five companies had more strengths than weaknesses in their service. This study shows the importance of setting clear standards for water service quality, and also, the study suggests that water companies need to



focus on improving the use of information system to address their weaknesses in providing better water service.

Furthermore, Pinto et al. (2017) conducted a study focusing on evaluating the overall performance of water utilities to ensure they meet the changing needs and maintain a balance between obligations, quality, and price/value for money. Researchers used the ELECTRE TRI-nC method to categorise the quality of service and aggregate performance indicators, applying an iso-preference logic for coherent criteria set and presenting results through a geographical information system. The study revealed that the current system of performance indicators was insufficient for a holistic performance evaluation, indicating a need for a more comprehensive assessment tool. This study suggests that the proposed method can serve as a useful decision support and regulatory tool, offering a clearer visualisation of water utilities' performance and guiding improvements in service quality.

3.2.3. Quantity of Service

A study by Silas et al. (2023) aimed to explore how social factors influence the delivery of water services in South Africa's largest municipalities, focusing on improving service delivery by understanding the impact of social practices. This study employed multivariate regression analysis to analyse panel data from 2013 to 2021. Data were collected from the 20 largest municipalities in South Africa by employing ordinary least squares (OLS) and feasible generalised least squares (FGLS) to understand the impact. The study found that several job opportunities positively affected a number (quantity) of service delivery performance, while service delivery protests had a negative impact. Many factors, such as housing expenditure, population size, and education level, had a neutral effect on service delivery performance.

Additionally, Enovwo et al. (2022) conducted a study to evaluate the service level of water supply systems (WSS) from the perspective of water users in Ogun State, Nigeria, focusing on access, quality, management, cost, and reliability of these services. Researchers used structured questionnaires to gather information from two groups of people: those who own or live close to water supply sources and those who do not live close by but use the water to understand the different experiences with water supply services. The study found that people who live with the water supply often do not share access with those who do not live there, making it hard for non-residents to get enough water. Some water systems also stop working in the dry season, showing that there's not enough reliable water for everyone. This research suggests the use of water information systems to predict water usage and distribution, especially those who do not have water

systems in their homes. It points out the need for better management and policies to improve water service coverage and reliability.

In relation to the above studies, Nikolay, Kiktev, and Busiurova (2022) also conducted a study to create a system that helps manage water supply by predicting and preventing accidents and ensuring water is available when needed. Researchers developed a database and used sensors to monitor water flow and humidity, helping predict possible water supply system issues. The system can predict water flow and humidity, alerting users to potential accidents that could affect the quantity and availability of water supply services. By preventing accidents in water supply systems, the study suggests improvements in the reliability and efficiency of water services, ensuring better access to water for users.

Finally, a study by Shadmanova and Karimova (2019) used modern technology to make sure water is used wisely, helping to grow more crops with less water. The study collected data and used new tech to manage water better, aiming to use water resources more efficiently. The research found that using information systems can help solve water use problems, like making sure there's enough water for crops by improving how water is managed. This study shows that by using technology, we can make better decisions on how to use water, which could lead to having enough water for more people and farms.

3.2.4. Reliability of Water Service

The study by Blodgett et al. (2016) addresses a critical aspect of water resource management by focusing on the conveyance systems within the Colorado River system, which is essential for distributing water to various users in the Lower Colorado River Basin. The methodology employed by the authors involves the use of information products that detail the mechanisms of water transfer, providing a clear depiction of the source-to-user water flow. The findings of this study are significant as they shed light on the operational intricacies of water conveyance in a major river basin, which is crucial for water availability and sustainability. The implications of this research extend beyond the Colorado River system, emphasising the broader necessity for robust and well-maintained water conveyance infrastructure to ensure the reliability of water supply in the face of growing demand and potential climate variability.

Wang et al. (2018) embarked on a study aimed at enhancing water resource management through the application of an Intelligent Water Network, leveraging new information technology to establish a comprehensive water management platform. The methodology involved the integration of advanced water management concepts with cutting-edge technology to facilitate efficient control



of the water cycle. The findings of the study underscored the efficacy of this integrated approach, demonstrating significant improvements in water management efficiency. The implications of this research are profound, highlighting the critical role that advanced technology plays in ensuring reliable and effective water management systems.

Furthermore, Choueiri et al. (2022) conducted a study to delve into the energy-water nexus within the context of Beirut, Lebanon, particularly focusing on the dichotomy between formal and informal water systems. The research aimed to shed light on the challenges faced by areas that depend on informal water systems, which are often adopted in response to water shortages. The methodology involved an exploration of the reliance on these systems for meeting daily water needs in regions plagued by water scarcity. The findings of the study underscored the significant dependence on informal water systems, which are critical for the sustenance of communities in water-scarce environments. The implications of this research are profound, emphasising the urgent need to tackle water scarcity issues to ensure consistent and reliable access to water.

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4.0 METHODOLOGY

This section uncovers the methodology employed by the researcher during research conduction. The study was conducted in Arusha, where the headquarters of the AUWSA are located. AUWSA has been selected as an appropriate study area because it is one of the major water and sanitation authorities in Tanzania. The study employed a descriptive research design. The design was chosen because it can broadly describe research phenomena. Also, it can answer the questions of what, when, where, and how, but it cannot answer the question of why (Miksza & Brenner, 2023).

4.1. Sampling

The population for this study was 409 employees of the AUWSA, from which a sample size of 113

respondents was established to be adequate for the study. The study took advantage of both nonprobability and probability sampling techniques, using simple random sampling and purposive sampling techniques.

4.2. Data Collection Method

The study collected only the primary data, which were collected by means of closed-ended questionnaires distributed to AUWSA employees (excluding top managers), while qualitative data were collected using interviews that involved top managers. which were closed-ended questionnaires and thus collected quantitative data) and an interview guide was used to collect qualitative data from top managers.

4.3. Data Analysis

The quantitative data was analysed by deploying descriptive statistics (mean and standard deviations). Pearson correlation analysis was performed to analyse the relationship between the effect of MajIS and service delivery at AUWSA. Qualitative data were analysed through content analysis. These analyses were carried out to complement the outcome of the study based on the analysis of the quantitative data.

To complete the analysis, a five-point scale was used where 1 represents Strongly Disagreed, 2 Disagreed, 3 represents Neutral, 4 represents Agreed, and 5 represents Strongly Agreed. Based on the mean values, the five-point scale ranges are as follows: mean scores of less than 1.5 represent strongly disagreed; mean scores of 1.5 but less than 2.5 represent Disagreed. Mean scores of 2.5 but less than 3.5 represent neutral; mean scores of 3.5 but less than 4.5 represent agreed; mean scores of 4.5 to 5 represent strongly agreed.

4.4. Quality Procedures

To ensure the validity and reliability of a study, a comprehensive approach that includes triangulation, reliability testing, and validity testing is essential. Triangulation involves using multiple data sources, methods, or theories to cross-verify findings, thereby enhancing the study's credibility and reducing bias. Reliability testing, such as test-retest assessment, was conducted to ensure that the study's measurements were consistent and reproducible over time (Said et al., 2011). Validity testing, on the other hand, confirms that the instruments and methods accurately capture the constructs they are intended to measure. This has been achieved through content validity, which



ensures the assessment tools adequately cover all aspects of the construct (Rubio et al., 2003). By rigorously applying these methods, the researcher has substantiated that the study is both trustworthy and accurately reflects the phenomena being investigated.

5.0 RESULTS

This study collected data from 113 respondents through questionnaires and interviews, which were distributed and later analysed through descriptive statistics and content analysis, as noted in Table 1 below.

Characteristic		Frequencies	Percentage
	Female	50	44.25%
	Male	63	55.75%
Gender	Total	113	100%
	18-30 years	49	43.36%
	31-40 years	44	38.94%
	41-50 years	13	11.50%
	51-60 years	7	6.19%
Age	Total	113	100%
	Certificate	36	31.86%
	Diploma	42	37.17%
	First Degree	30	26.55%
	Postgraduate Degree	5	4.42%
Education	Total	113	100%
	Less than 5 years	44	38.94%
Duration of	5-10 years	50	44.25%
service	Above 10 years	19	16.81%
	Total	113	100%
Position in	Operational Officer	109	96.46%
organization	Management Staff	19	3.54%
organization	Total	113	100%

Table 1: Demographics of the Respondents

Source: Field study (2022)

5.1. Effect of MajIS on Enhancing Customer Service Delivery

The study has examined the effect of MajIS on the accessibility of water and sanitation services provided by AUWSA. The general results based on the composite mean of descriptive statistics confirm that MajIS has effects on enhancing customer service delivery at AUWSA, as evidenced by a composite mean of 4.221239, which means respondents agreed on the same. Further details on findings are presented in Table 2 below.

Variable	Mean	Std. Dev.	
Accessibility	4.283186	0.6334293	
Availability	4.20354	0.7695	
Quality	4.300885	0.4606857	
Reliability	4.371681	0.5854591	
Composite Mean	4.221239	0.7645553	

Table 2:	Descriptive	Statistics of	n the Effect	of MajIS
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Source: Field data (2022)

5.1.1. Accessibility of Service

The descriptive analysis revealed a mean score of 4.283186 for the variable' Accessibility of service'. This score falls within the range of 3.5 to 4.5 on the five-point scale, which indicates that respondents generally agreed that the MajIS at AUWSA has enhanced the accessibility of water services. The agreement on the MajIS's positive impact on service accessibility suggests that users find the system effective in making water services more available or easier to use. This could be due to the MajIS providing better information on service availability, locations of water points, or scheduling. The high mean score reflects a perception that the system has likely reduced barriers to accessing water services.

Apart from the above findings, managers who were interviewed also asserted that "*MajIS has significantly reduced the time it takes for our customers to locate and access water services, which has been particularly beneficial in underserved areas.*" This statement supports the quantitative finding of a mean score of 4.283186 for 'Accessibility of service.'

5.1.2. Quantity of Service

For the 'Quantity of service' variable, the study found a mean score of 4.20354. This score also indicates agreement among respondents that the MajIS at AUWSA has positively affected the quantity of water service delivery. While still within the "agreed" range, the mean score for quantity



is slightly lower than for other variables. This suggests that although respondents are generally satisfied with the quantity of service provided through the MajIS, there may be some areas where expectations are not fully met. It could reflect limitations in the system's ability to manage or report on the actual volume of water delivered.

In addition to the above findings, the researcher examined the quantity aspects of water services offered by AUWSA. One of the managers responded that "*the introduction of MajIS has allowed us to manage our water resources better, but we acknowledge there are peak times when the demand exceeds our current capabilities.*" This statement would align with the slightly lower mean score of 4.20354 for 'Quantity of service.' Although the statement provides a general acceptance level among respondents, it also presents that service quantity does not fully meet user expectations, particularly during peak demand periods.

5.1.3. Quality of Service

The mean score for 'Quality of service' was found to be 4.300885, which signifies that respondents agreed that the MajIS at AUWSA contributes positively to the quality of water service delivery. This score reflects a strong perception that the MajIS has a favourable impact on the quality aspect of service delivery. It suggests that the system may help ensure that the water provided meets certain standards or that service information is accurate and reliable.

In support of the above findings, it is clearly noted that MajIS has effects on the quality of service, as highlighted by one respondent who said, *"Thanks to MajIS, we have more control over water quality monitoring, ensuring that our customers receive safe and clean water consistently."* The statement correlates with the mean score of 4.300885 for 'Quality of service,' indicating a positive perception of MAJIS's impact on water quality.

5.1.4. Reliability of Service

The variable' Reliability of service' received a mean score of 4.371681, the highest among the variables, which indicates a strong agreement that the MajIS at AUWSA enhances the reliability of water service delivery. The high mean score for reliability suggests that respondents particularly value the MAJIS's role in providing consistent and dependable water services. This could mean that the system effectively predicts and communicates service disruptions or that it ensures a steady supply of water.

Concerning the above findings, managers have noted the impact of MajIS on service reliability.

One of the managers commented that "MajIS has been instrumental in minimising service disruptions, providing our customers with a reliable water supply that they can trust." Such a statement is in line with the highest mean score of 4.371681 for 'Reliability of service,' which means reduced service interruptions and enhanced trust in the water supply's consistency, reflecting the system's ability to deliver reliable services.

5.2. Correlation Between Effect on MajIS and Customer Service Delivery

The findings in Table 3 on the Pearson correlation analysis determine the relationship between the effect of MajIS in enhancing customer service delivery in AUWSA. The findings indicate that:

Customer Service Delivery and Accessibility: The correlation coefficient between these two variables is 0.7544, indicating a strong positive relationship. This implies that as the accessibility of the water information system improves, customer service delivery tends to improve significantly as well. Water utilities should focus on enhancing the accessibility of their information systems to positively impact customer service delivery.

Customer Service Delivery and Quality: With a correlation coefficient of 0.5450, there is a moderate positive relationship between these variables. This suggests that improvements in the quality of the water information system are associated with better customer service delivery, though not as strongly as accessibility.

Customer Service Delivery and Availability: The correlation coefficient of 0.5191 indicates a moderate positive relationship. This implies that increased availability of the water information system is associated with improved customer service delivery.

Customer Service Delivery and Reliability: With a correlation coefficient of 0.4131, there is a moderate positive relationship between these variables. This suggests that enhancing the reliability of the water information system can contribute to better customer service delivery, though to a lesser extent compared to the other factors.

	Customer	Service	Accessibility	Quality	Availability	Reliability
	Delivery					
Customer Service	1.000					
Delivery						
Accessibility	0.7544		1.0000			

Table 3: Correlation Analysis



Quality	0.5450	0.4302	1.0000		
Availability	0.5191	0.5927	0.5561	1.0000	
Reliability	0.4131	0.4359	0.3062	0.3762	1.0000

Source: Field data (2022)

5.3 Discussion on the Finding

Effect of MajIS on Enhancing Customer Service Delivery

Based on the findings of the descriptive statistics on the effect of MajIS on enhancing customer service delivery by AUWSA, MajIS has a significant high effect on ensuring the accessibility of water and sanitation services by AUWSA. Also, MajIS has a significant effect in ensuring the availability of water and sanitation services by AUWSA. Similarly, MajIS was found to have a significantly high effect in ensuring the quality of water and sanitation service by AUWSA. It is also evident that MajIS has a significant effect in ensuring the reliability of water and sanitation services by AUWSA.

The finding is supported by past findings reported by Opiyo and Mwalili (2020), who employed the descriptive cross-sectional research design and used data collected from a sample of 300 staff of four water utility companies in Kenya with an aim to find the effect of integrating mobile-based ICT solutions in service delivery by water utility companies in Kenya. The study revealed that the mobile metre reading system had a significant effect on service delivery, the complaints management system had a significant effect on water service delivery, the 'soma mita' application had a significant effect on water service delivery, and the bill query application had a significant effect on water service delivery.

5.3.1. Effects of Service Accessibility on Customer Service Delivery

In this study, it was noted that accessibility of service has effects on customer service delivery. This confirms that enhancing accessibility to services can lead to improved customer satisfaction, which fosters customer loyalty, improves brand reputation, and provides a competitive advantage (Otoo et al., 2022). Accessibility dimensions such as access convenience have been found to positively influence customer satisfaction in various sectors, including commercial banks. Moreover, the convenience of service delivery, including factors like decision convenience, access convenience, transaction convenience, benefit convenience, and post-benefit convenience, has been linked to increased customer satisfaction and loyalty (Kaura et al., 2015).

5.3.2. Effects of Quantity of Service on Customer Service Delivery

The issue of quantity of service was found to be noteworthy in this study and thus supported studies. The quantity of service delivered to customers plays a vital role in customer service delivery. It refers to the volume of service that a customer receives, which should meet or exceed their expectations. Adequate service quantity ensures that customers' needs are fully met, leading to higher levels of satisfaction (Tian et al., 2023). When the quantity of service is perceived as insufficient, it can lead to customer dissatisfaction and a potential decrease in loyalty. Therefore, service providers must manage their resources effectively to deliver the right amount of service to meet customer demands.

5.3.3. Effects of Quality of Service on Customer Service Delivery

As noted in previous findings in this study, the issue of quality of service is a crucial factor in customer service delivery. Research indicates that service quality dimensions, such as tangibles, reliability, responsiveness, empathy, and assurance, significantly impact customer satisfaction (Silva et al., 2022). Service quality has been found to have a positive and significant influence on corporate image and customer satisfaction, highlighting its importance in ensuring customer loyalty and retention (Engriani et al., 2019). Additionally, service quality has been linked to customer loyalty through its impact on customer satisfaction (Ghimire et al., 2021).

5.3.4. Effects of Service Reliability on Customer Service Delivery

Finally, this study delved into reliability, as noted in the findings presented previously, that reliability of service affects customer service delivery. Studies have shown that reliability, along with other factors like visibility, responsiveness, and employee commitment, can positively influence customer satisfaction (Islam et al., 2020). Ensuring reliability in service delivery is essential for building trust with customers and meeting their expectations, ultimately leading to higher levels of satisfaction and loyalty.

6.0 CONCLUSION AND RECOMMENDATION

6.1. Conclusion

In relation to the effect of MajIS on enhancing water and sanitation customer service delivery, it is concluded that there is a moderate positive linear relationship between the level of customer satisfaction and accessibility of water and sanitation services, availability of water and sanitation services, quality of water and sanitation service, and reliability of water and sanitation services.

6.2. Recommendation

The following recommendations are put forward with the aim of improving water and sanitation



customer service delivery through MajIS:

- i. The government and AUWSA should invest in infrastructure to expand service coverage, ensuring that more areas can easily access water services provided by AUWSA.
- ii. AUWSA should develop an effective implementation strategy to ensure the effective use of MajIS in enhancing water and sanitation customer service delivery.
- iii. AUWSA should train and develop its technical team to be responsible for MajIS to ensure that it is capable of providing essential technical support to the MajIS.
- iv. AUWSA should integrate the MajIS with its water and sanitation customers to allow direct interactive two-way communication between AUWSA and its customers to enhance the delivery of customer service and allow customers to directly inform AUWSA of any problem, including water/sewerage leaks in supply lines.
- v. AUWSA should engage with community stakeholders to understand their specific needs and preferences, which can inform further improvements in service delivery.
- vi. AUWSA should establish clear performance metrics for accessibility, quantity, quality, and reliability of service to regularly assess and benchmark service delivery against these metrics.
- vii. Technology Upgrades: Explore the use of advanced technologies, such as remote sensing and smart metering, to enhance the efficiency and responsiveness of the water service system.

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