ICT4SDG 6: Embracing ICT Integration Attainment of Decency of Water Services Delivery

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ARTICLE INFO	ABSTRACT
	Technological opportunities should be leveraged for the attainment of SDG 8 in SDG 6. In the 21st century, the majority of organizations have adopted and incorporated computer technology for the general management of their day-to-day activities. Even though almost all organizations have begun adopting the use of computers and management information systems, water supply companies like Igemo Water Supply company remain sluggish in realizing Digitization objectives. It is on this basis that the study was conducted to collect findings on ICT integration in water billing and consumption to enable the process of implementation, and deployment of a digitized water billing and consumption system. The researcher conducted an empirical review to collect literature information for the development and deployment of an electronic water billing and consumption system (eWBCS) for the Igemo water supply company to support the company in enhancing the convenience and efficiency of water billing and consumption management. The prototype of the system was iteratively tested and incrementally improved based on additional user requirements and prevailing environmental needs. The study found that the digitization of water billing and consumption will bring about convenience in water management.

1. INTRODUCTION

In the current 21st century, management and operations in organizations and institutions have seen the importance of the adoption of information management and computer-aided systems to ensure the effectiveness and efficiency of their day-to-day activities. ICT integration into services is a new trend that every service industry is looking forward to adopting. In water supply companies, digitization cuts across several managerial and operational factors, such as billing, management of consumers 'records and reports,

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ICT integration to payment, and ICT integration into a dedicated communication channel (Voutchkov et al., 2019).

The constant change in needs and uncertainties has shifted the focus to technology as a new trend for solving challenges. The constant increase in water needs in urban and rural areas to serve the large population count per unit area has resulted in an increase in workload by the service providers and huge volumes of user records and reports managed manually. The proportion between the service providers and the consumers creates difficulty in tracking the consumption and billings of the users; hence there is a need for the use of integrated systems (Voutchkov et al., 2019). In Africa, Safe Water Networks of Ghana is investing in research on the adoption and use of ICT integration in water services (Safe Water Network, 2018).

According to the International Water Association (IWA) 2019–2024 Strategic Plan, the digital revolution has a major impact on water consumption (Toilet Board Coalition, 2016). Similarly, a study by (Xi et al., 2009) has attested to the fact that a digitized water billing system will be of great benefit to both the water supply company and the consumers in many ways like; reduction of connection cost, better service delivery to customers and increase revenue by enabling new business models to fit the 4th industrial revolution era. The study also determined that the lack of an integrated water billing system has been a critical issue affecting most consumers who want to pay their water bills online. Another study by Sprocati and Blum (2019), has shown that there has been significant economic growth brought up by the adoption of integrated systems and ICT infrastructure in the water billing and consumption in Indian Wells Valley Basin Water Company of California, this has resulted in extensive research by some big water companies throughout the world to incorporate and adopt digitization in offering their services.

ICT integration into water resource management can enhance the attainment of sustainable development goals (SDG) leading to improved service delivery in the water supply leading to the realization of decent living conditions as per the UN SDG 6 and SDG 8 (ICT4SDGs) (United Nations, 2016). This study was anchored on the World Bank G20 principles of digital financial inclusion that state that ICT integration to services comes with several opportunities for financial growth, hence facilitating the achievement of the World Bank Development Research G20 Goals of economic growth (Global Partnership for Financial inclusion, 2016; Klapper & Singer, 2014).

In the case of Igemo Water Supply Company, the management of water billing and consumption is still manual even though the current shift is toward adopting ICT to achieve accuracy, efficiency, and effectiveness in service delivery. The manual system is prone to challenges in terms of keeping track of payment and consumption of water by the consumers, which results in a huge accumulation of water bills and inconveniences regarding payment. Therefore, this study was intended to develop and deploy an integrated water billing and consumption system to help in solve the aforementioned problems by enabling consumers to keep track of their water consumption and billing levels by logging in to their accounts and viewing the statements and making payments through the system either online or by use of an integrated USSD code**.**

The untamed losses due to leakages for long-range water service is another matter that should be addressed with the agency to incorporate real-time water leakage detection systems to give real-time monitoring.

2. LITERATURE REVIEW

Many relevant literature pieces of information were reviewed and cited from both the local perspective and the global perspective to investigate the study objectives. The study's literature review was framed on critiques, comparisons, and contrasts of written works.

2.1 Impact of Computer Systems on Enabling Billing Transparency

The capacity of the consumer to monitor his/her consumption enhances transparency, thus reducing the chances of unnecessary corruption. Regular track keeping of bill status is a key factor in enhancing the efficiency of water services, this can only be achieved effectively by the deployment of ICT in water services delivery. Water is a critical resource for day to day running of human activities, water-related decisions should be made as a matter of agency hence digitization will provide a localized self-managerial plan that will help the consumers make any decisions about billing and consumption over a decentralized platform (Otuke, 2016).

According to the pilot study that was conducted by the world bank to sensitize the application of ICT in water service delivery in African countries, some countries that were selected for the pilot study are Mali, Senegal, Niger, Benin, Sierra Leone, Liberia, and Kenya. It was found that there is a need to deploy systems that will ensure efficiency and transparency of billing and consumption (Ndaw & Mwangi, 2015).

The 4th industrial revolution has shown a significant improvement in the economy by incorporation of ICT (KIPPRA, 2021), hence ICT integration into water billing and consumption will enable water service companies to enter the digital tech-dominated age, thus embracing new levels of water usage awareness, data analysis and providing a dedicated communication channel for effective feedback and consultation (Ariana, 2016). According to the research that was conducted by Arina in Australia and that conducted by the US Department of Energy (Ariana, 2016; US Department of Energy, 2016), the results showed the significance of ICT integration in water services toward the enhancement of efficiency and easy monitoring of consumption and billing.

The adoption of technology in the water industry will enable the reduction of information asymmetries, hence mitigating petty corruption cases experienced in the analogue, paperwork era hence promoting transparency and restoration of consumer dignity while being served (Krolikowski, 2014). The adoption of smart technology will enhance the efficiency, effectiveness, and convenience of water billing and consumption monitoring (Ariana, 2016). Technology incorporation in domestic water usage helps in the behavioural monitoring of water consumption at individual appliances (Yang et al., 2017).

2.2 Impact of Digitizing Water Services in Minimizing Time Taken to Meet Managerial Goals

Water billing is a systematic process. There are many activities involved in water billing thus the time taken to process the water bills manually is relatively higher. ICT is a key enabler in enhancing work efficiency by reducing the time taken to process information (Champanis et al., 2014; Gideon, 2015). According to the Nairobi Water and Sewage Company, the incorporation of ICT into their services enables them to collect meter readings, manage customers' accounts, the handling of customer queries, and computation and deliver water bills (Gideon, 2015).

The objective of a manager regarding billing and consumption is to achieve accurate information about water billing, hence achieving accuracy within the short time possible, thus ICT is very fundamental (Abra State Institute of Sciences and Technology, 2016). According to Ambre (2016), Dzikus the director of the Water Asian City program in India categorically made it clear that an efficient system of water billing can only ensure timely service by enhancing the timely raising of water bills and Elimination of avoidable delays.

Inaccurate billing calculations call for a series of review checking of water bills to correct the human errors and the end cannot be assured of 100% error-free water bills, but through a computerized water bill generation mechanism 100% accuracy can be achieved within a short time (Abra State Institute of Sciences and Technology, 2016; Otuke, 2016; Wehn & Montalvo, 2018).

The United nation, sustainability development goal 6 (SDG 6) ensures the availability and management of water and sanitation for all by 2030, and sustainable development goal 8 (SDG 8) aims to ensure the achievement of decent working conditions (The United Nations Development Programme, 2015) yet by 2030, the population is expected to be more than 8billion hence, without the deployment of ICT to service delivery, more so water there are high chances of overworking and delaying of services delivery (Stankovic et al., 2020).

The main aim of the adoption of ICT in service delivery is to enhance efficiency by speeding up the time taken to achieve the operational and managerial goals of an organization not to replace human beings as per the claims of the United Nations Human Rights Global Network Initiative for Human Rights (Jungk & Allison-Hope, 2011). Generally, ICT is changing the management landscape of water billing and consumption by improving service delivery, improving access, and improving management (Ndaw & Welsien, 2015).

2.3 Usability Heuristics for a Good Interactive Computer System

A good system should have the capability to support all users to achieve the major basic purpose of the system with a critical concern to the novice users. Some countries like Kenya have begun seeing the importance of the application of ICT in the management of water services, but still, there is a huge gap left, in the case of the already existing systems in Kenya, an example is the Nairobi Water's Payment Portal (*JisomeeMita*) (Asia Smart City Conference (ASCC), 2021). Unlike *JisomeeMita* where only those who have smartphones or any internet-enabled devices can use the system, while others must look for someone to do for them the service at a fee and the only mode of payment is Mesa. The system to be developed will have the capability to allow consumers who don't have access to smartphones to make their water bill payments through a USSD code method also, it will support consumers who should pay their water bills through the master card, visa card, and credit cards.

As research dictates, a good system should be incorporated with the user's manual to guide the user to self-learn how to use the system or train the users on how to use the system not to assume that users will know how to use the system (Mitra & Dangwal, 2017). The emerging technological evolution has resulted in changing needs and applicability of technology; thus, a critical usability heuristics evaluation must be conducted when developing a new system for the users to enable the development of a dynamic system that adapts to changes in constraints. An interactive HCI should be designed to promote consistency of system use (Gómez et al., 2014).

3.   MATERIALS AND METHODS

3.1 Research Design

The study adopted a descriptive survey research design to aid in describing the behavioural characteristics and phenomenon of digitization in the water company and the consumers and to explain the relationship between the variables in the study since variables are interrelated and interconnected to one another. That is to explain how data and computer literacy skills, performance expectancy, system quality, modern technology, and digitization of water billing and consumption relate to and affect change each other.

3.2   Sampling

The study targeted the 300 households connected with Igemo Water and the 10 staff of Igemo Water Supply Company located in the Marani Ward, Kisii County. From this population, using the Krejcie and Mogan table (Krejcie & Morgan, 1970), a sample size of 169 consumers and 10 staff was derived. The study adopted a clustered sampling technique to cluster the users given that Igemo water service consumers over a large area covering two wards; *Rioma ward and Marani ward*. 17 samples were selected from 9 clusters and 16 from the remaining cluster, 10 staff participated in the study.

3.3   Data Collection

The researchers used questionnaires, interviews, and surveys to collect data. Both open-ended and close-ended questionnaires were prepared and given to the respondents to answer, and responses were collected for analysis. Scheduled field interviews were administered in person to the respondent. Phone and online interviews were also used to collect data from the staff of Igemo Water. During the administration of the questionnaires, the researcher minimized data collector bias by ensuring that only the researcher administered the questionnaires. The researcher ensured standardized conditions such as exhibiting similar personality traits to all respondents i.e., ensuring similar habitual patterns of behavior, temperament, and emotion. Respondents were given adequate time to fill in the answers in written form and the researcher collected the questionnaires with the completed information. Respondents were given time to complete answering the questions and all the questionnaires were gathered after the given response time was over.

During the administration of the interviews, the researcher identified respondents and requested them to answer the set questions. In the entire process of the interview, the researcher engaged in noting down the responses. The researcher approached identified respondents in person and persuaded them to participate in the study.

The pilot study was conducted whereby the research instruments were subjected to several tests. A pilot test was conducted to confirm the usability of the developed model. The system should always keep users informed about what is going on, through appropriate feedback within a reasonable time, error prevention, and recognition rather than recall, which minimizes the user's memory load by making objects, actions, and options visible.

4.   RESULTS

4.1   Demographic data of the staff

4.1.1   Computer Literacy

Fig. 1 shows the level of computer literacy by the staff of the Igemo water manufacturer, where 4 (40%) of the staff had an average good computer literacy level followed by 2 (20%), and 2 (20%) had a good computer literacy level and low computer literacy level, respectively. Those who had excellent computer literacy levels recorded a tie with those who had very low computer literacy levels (1,10%). The above findings indicate that most staff could use a computer to achieve basic operations, while only one could use the computer to achieve complex operations. These results imply that extensive training needs to be conducted to enable the usability of the e-WBCS by the staff.
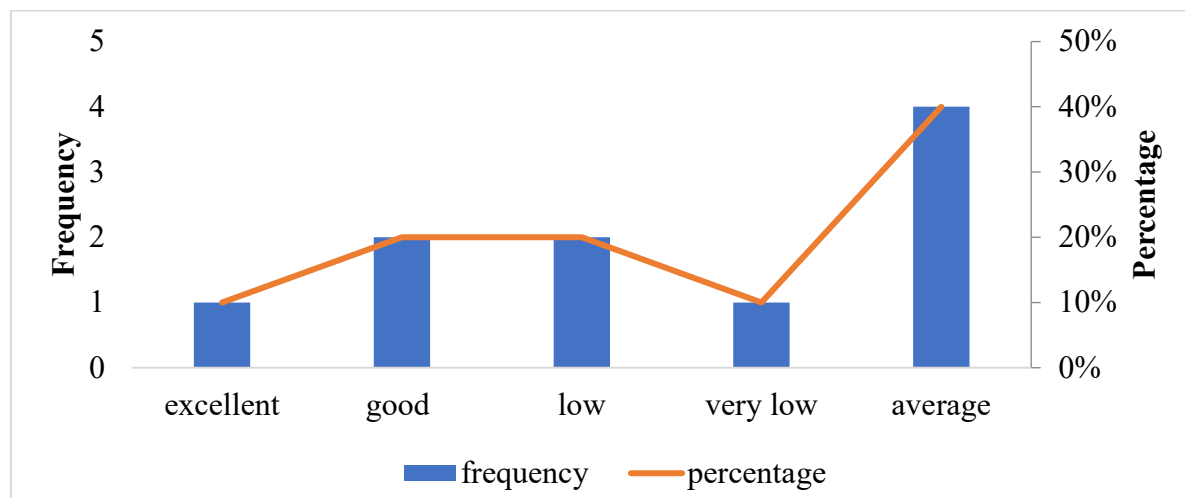
Fig. 1. Igemo water staff computer literacy level

Source: Research Data (2022)

The results also showed that 7 (70%) of the total staff owned an internet-enabled device while 3 (30%) of the respondents had not owned an internet-enabled device. The common internet-enabled device that the respondents had was a smartphone, hence a mobile-compatible system would be more effective. The above findings imply that a web-based system will not facilitate usability for all staff; hence, the development of a USSD code application will facilitate the usability of the system by both staff.

4.2   The section that Needed Digitization

Table 1 indicates that 6 (60%) of the total respondents believed in digitizing all the managerial and operational activities associated with water billing and consumption, 2 (20%) were for the water bill preparation, while those for bill payment and bills dissemination recorded a tie of (1.1%). The above findings imply that all staff supported the digitization of water billing and consumption.

Table 1. Section that needs digitization most

Section to be digitized	frequency	percentage	Cumulative Percentage
Water bill preparation	2	20%	20%
Water bills Payment	1	10%	30%
Water bill dissemination	1	10%	40%
All of the above	6	60%	100%
None of the above	0	0	100%
Total	10	100%	

Source: Research Data (2022)

4.3   Frequency of Error Checking

Fig. 2 shows the respondents' opinions about whether they error-checked the water bills before disseminating them to the respective consumers. Five (50%) rarely checked for errors, 3 (30%) have never checked for errors, and 1 (10%) sometimes checked once or very often.
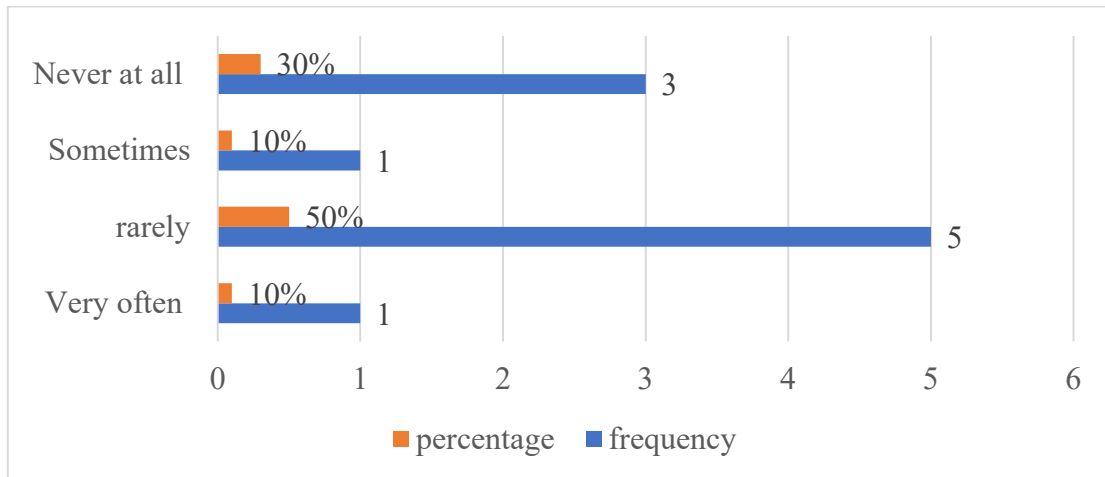
Fig. 2. How often do staff check for bill errors

Source: Research Data (2022)

4.4 Digitization will Ensure a 100% Accuracy level

Fig. 3 shows the respondents' views on whether digitization will promote 100% accuracy in water billing, whereby 7(70%) of the respondents strongly agreed, followed by 2(20%) who agreed, and 1(10%) neither agreed nor disagreed, and nobody disagreed. The above findings imply that the respondents believe that digitization will enhance the accuracy of the water billing process.
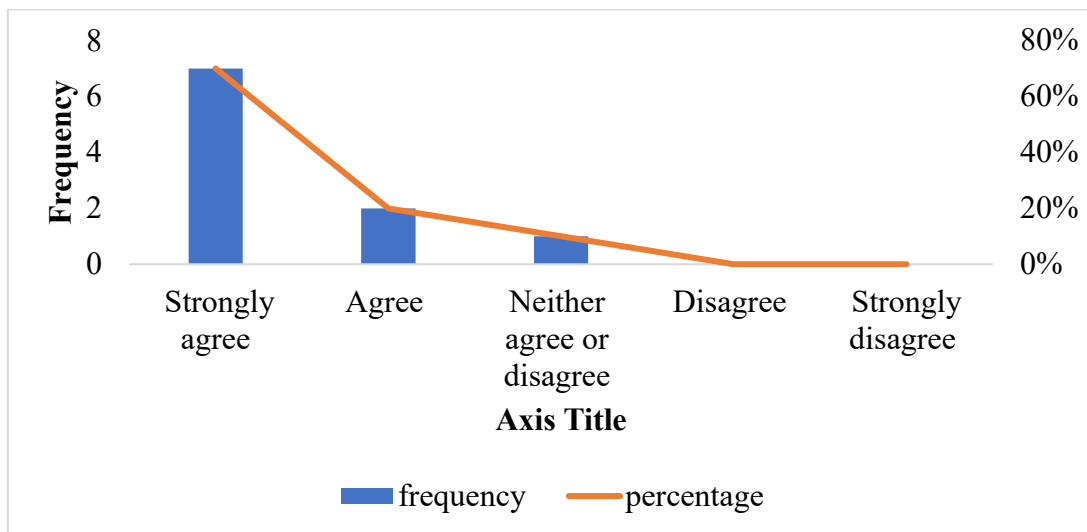

Fig. 3. Attainment of 100% accuracy through digitization

Source: Research Data (2022)

4.5 Demographic Characteristics of Consumers of Igeno Water

Most of the respondents were female (62%) and male (38%) of the total respondents. Table 2 indicates that most respondents had attained secondary school level of education (44%, 75), followed by primary level (26%, 44), tertiary (18%, 30), and the minority who had not schooled at all (12%,20).

Table 2. Consumers' level of education

Education level	Frequency	Percentage (%)
Primary	44	26%
Secondary	75	44%
Tertiary	30	18%
None	20	12%
Total	169	100.00%

Source: Research Data (2022)

4.5.1 Consumers' Computer Literacy Level

Fig. 4 shows respondents' computer literacy level, (124, 73%) of the respondents recorded a low computer literacy level, (21, 12%) recorded a relatively good computer literacy level, (14,8%) recorded an excellent computer literacy level, and (10, 6%) recorded a good computer literacy level. The findings imply that most respondents had little knowledge of computers.
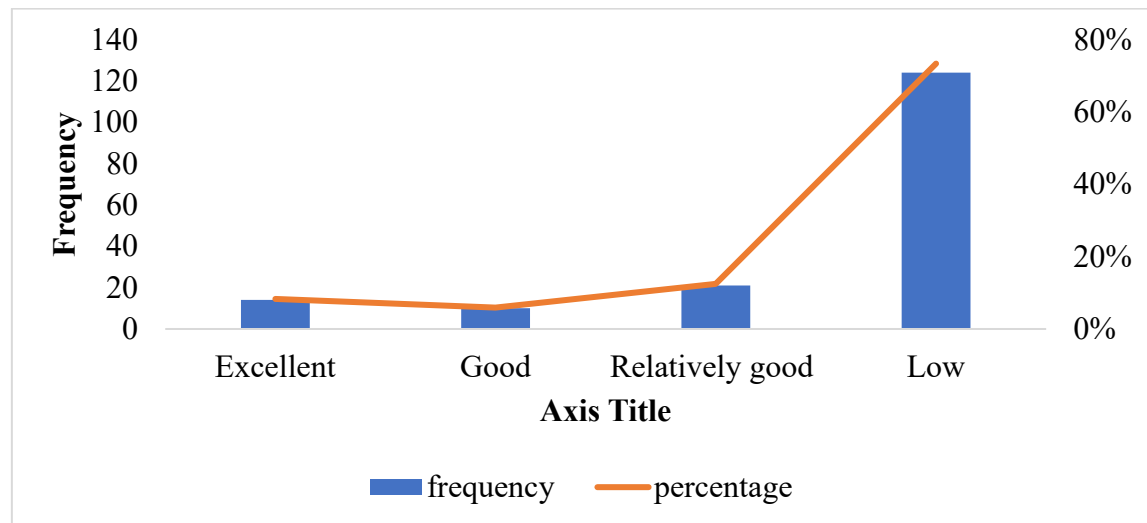

Fig. 4. Consumers' Computer Literacy Level

Source: Research Data (2022)

4.5.2 Consumers Owning Internet-Enabled Devices

Out of the 169 consumer respondents, 150 (89%) had internet-enabled devices, while 19 (11%) had no internet-enabled devices. The above findings indicate that not all respondents can access the digitized services over the web, hence USSD code incorporation will enhance 100% usability.

4.5.3   *Digitization and Promotion of Convenience of Water Billing*

Table 3 shows respondents' opinions about the promotion of convenience of the water billing process through the incorporation of ICT. (84,49.7%) of the respondents who strongly agreed, (53, 31.4%) agreed, (18, 10.7%) disagreed, (13, 7.7%) strongly disagreed, and (1, 0.6%) was undecided.

Table 3. Consumers' responses to digitization to promote the convenience of water billing

Convenience of the Water Billing	Frequency	Percentage	Cumurative Percentage
Strongly agree	84	49.7%	49.7%
Agree	53	31.4%	81.1%
Neither agree or disagree	1	0.6%	81.7%
Disagree	18	10.7%	92.3%
Strongly disagree	13	7.7%	100.0%
Total	169	100.0%	

Source: Research Data (2022)

4.6   Digitization and Promotion of Transparency

Fig. 5 implies that 84 (49.7%) respondents strongly agreed that digitization will enhance transparency, 53 (31.4%) agreed that digitization will enhance transparency, and 18 (10.7%), 13 (7.7%), and 1 (0.6%) disagreed, strongly disagreed, and neither agreed nor disagreed, respectively. Many respondents were positive about enhancing the transparency of billings through digitization.
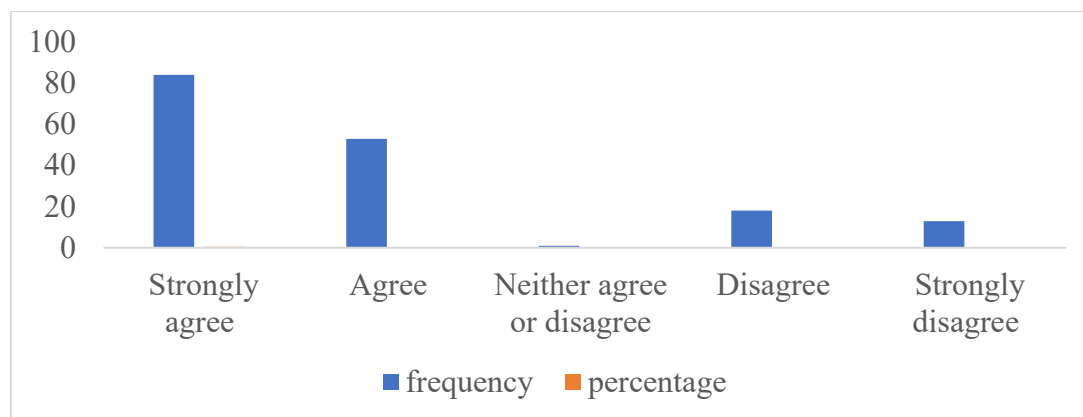

Fig. 5. Digitization to enhance billing transparency

Source: Research Data (2022)

4.6.1   *On-time Delivery of Water Bills*

Fig. 6 shows the respondents' views about water bill delay, indicating that 147 (87.0%) respondents have never received water bills on time, 13 (7.7%) sometimes received the water bills on time, while 9 (5.3%) received their water bills on time once since they were connected with water.
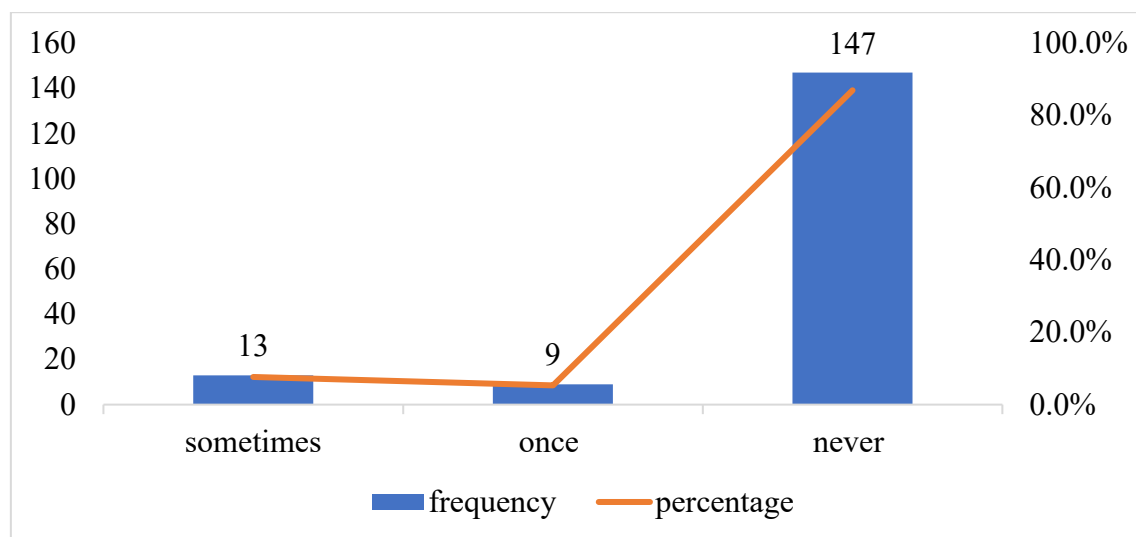

Fig. 6. Delay of water bills

Source: Research Data (2022)

4.7 Digitization in the Performance of the Igemo Water Supply Company

The study assessed the opinions of the officials regarding the various aspects of digitization in the performance of the company. The respondents' opinions were thematically organized in triangulation with the research objectives, coded and analysed using SPSS, presented, and interpreted.

4.7.1 Causes of Delayed Payment of Water Bill

In the conducted interviews, the respondents were asked to give their opinions on what they thought caused the delay in paying for water bills. Their responses are summarized in Table 4.

Table 4. Respondents' opinions on the causes of a delayed payment of water bills

Opinion	frequency	percent
Untimeliness bill dissemination through manual bill dissemination	7	70.0
Inefficient internal structure in the company	1	10.0
Appropriateness of the levels of service to affordability	1	10.0
Inaccurate master meters for commercial and domestic use that bring about disputable payments	1	10.0
Total	10	100

Source: Research Data (2022)

Most respondents, 7 (70%) opined that untimeliness bill dissemination through manual bills dissemination delayed payment of water bills, 1(10%) believed of the appropriateness of the levels of service to affordability, 1(10%) stated inaccurate master meters for commercial and domestic use which

result in disputable payments and 1(10%) reported of inefficient internal structure in the company. It is imperative that when the services are unsatisfactory, payments for such services become a challenge. For instance, when the system delays in disseminating bills to consumers, they will equally delay settling payment for the services likewise when there are disputes like overpricing due to system error. Similarly, when tariffs have been adjusted, the cost of paying for the bill rises, which results in an overstretching of the consumer budget, especially when there exist economic constraints.

4.8   Issues with Billing Systems, which Affect the Payment of Water

The study sought to understand the issues encountered with billing systems that affect the payment of water and the kind of influence of the issues in the company. Table 5 summarizes the findings.

Table 5: Issues with billing systems that affect the payment of water

Issues with billing systems	Frequency	percent
The tiresome process involving water billing	2	20.0
Bureaucratic controls	1	10.0
Mode of bill	5	50.0
Bill delivery	2	20.0
Total	10	100

Source: Research Data (2022)

According to the study findings, 1(10%) of the respondents affirmed that bureaucratic control was the major issue in the billing system. This is because, in every organization, coordination of service delivery involves different structures of the organization, and failure of one structure impacts negatively on the other because of delayed services or reduction in the quality of services provided. Among the respondents, 2(20%) stated the process involved in billing, 5(50%) stated the mode of billing, and 2(20%) stated bill delivery. Difficult and many steps in billing, extensive mode of billing, and bill delivery as indicated by the systems make the consumers bill the wrong account. System failures or suspensions to allow upgrading make consumers sometimes exhausted with the digitization and as a result, delay in paying bills is experienced. This implies that the issues in the billing systems affect consumers causing them to change their behaviours regarding the convenience of the services and thus look for other means of meeting their needs. This coincides with the six composite dimensions of customer behaviours to service delivery; provision of convenient/accurate operations; the accessibility and reliability of service provision; good line management; service personalization; the provision of friendly and responsive customer service; and the provision of targeted customer service. Perceived usefulness, security, and privacy are the main perusing factors to accepting service.

4.8.1   Impact of Existing Revenue Collection Mechanisms on Billing

The study also sought to understand the challenges in the existing revenue collection in an attempt to ascertain the digitization of the Water Supply Company. The respondents' views are presented in Table 6.

Table 6. impact of revenue collection mechanisms on water bills payment

Challenges in existing revenue collection	Frequency	Percent
Weak bills and revenue mechanism	4	40.0
Lack of centralized repository data	4	40.0

	0	0
Unstable water tariffs	0	0
Untimely water bill dissemination	2	20.0
Total	10	100

Source: Research Data (2022)

The main challenges in the existing revenue collection mechanisms were untimely water bill dissemination, unbilled consumers, and weak billing and revenue mechanisms, as stated by 100% of the respondents. Of other respondents, 4(40%) stated a lack of centralized repository data and weak billing and revenue mechanisms. These challenges affect the payments. For instance, a lack of a detailed listing of which section has what data and at what cost interferes with allocation decisions due to incomplete data or no data at all.

4.9   Association between the Dependent Variables and the Dependent Variable

The association between the dependent variables and the dependent variables was assessed using Spearman rank correlation. The study findings are presented in Table 7.

Table 7. Spearman's rho of the relationship between predictor and explanatory variables

		1	2	3	4
1. Convenience	Correlation Coefficient	1	.425**	0.142	0.13
	Sig. (2-tailed)		0	0.086	0.06
	N		169	169	169
2. Transparency	Correlation Coefficient		1	0.124	0.356
	Sig. (2-tailed)			0.135	0.01
	N			169	169
3. On-time delivery	Correlation Coefficient			1	0.151
	Sig. (2-tailed)				0.09
	N				169
4. Digitization	Correlation Coefficient				1

Source: Research Data (2022)

The study findings (see Table 7) revealed a statistically significant positive correlation between convenience and digitization (rho = 0.13, p = 0.06). This implies that the appropriate use of digitization in the management of water supply operations will improve convenience and thus better service provision to consumers. Regarding transparency, a statistically significant positive correlation was observed (rho = 0.356, p = 0.01). The study also revealed a positive correlation between on-time delivery and digitization. These findings imply that the adoption of digitization in the company results in improved transparency and on-time delivery. This is because of increased awareness of the payment of the bills, defaults can easily be traced by just a single call and the company can monitor every meter connected to the master meter to ensure consistent service delivery. The company can also follow up on consumers' complaints and ensure the usefulness of the services. This will also enable the provision of accurate operations, accessibility, and reliability of the service provision, service personalization, and provision of friendly, responsive, and targeted customer service and thus ensure perceived usefulness, security, and privacy, which are the main factors in accepting the service.

5. DISCUSSION

The impact of digitization on water billing was determined by assessing the weaknesses of the existing manual system using the following parameters; computer literacy, education level, ownership of the internet-enabled device, timeliness, the convenience of bill payment, transparency and frequency of error checking from both the staffs and customers perspective.

From these findings, it is evident that most respondents had a secondary and primary school with (75, 44%) and (44, 26%) respectively, while (30, 18%) and (20,12%) of the respondents had tertiary or unschooled at all. (124, 73%) of the respondents who recorded low computer literacy levels, (21, 12%) recorded relatively good computer literacy levels, (14,8%) recorded excellent computer literacy levels, and (10, 6%) recorded good computers. This implies that the level of education had a greater influence on computer literacy.

(84, 49.7%) of the respondents who strongly agreed, (53, 31.4%) agreed, (18, 10.7%) disagreed, (13, 7.7%) strongly disagreed (1, 0.6%) were undecided about the adoption of ICT to enhance the convenience and transparency of water billing and consumption, this implies that most respondents were positive about the digitization of water billing and consumption. The findings indicated that (147, 87.0%) of the respondents have never received water bills on time, (13, 7.7%) sometimes received the water bills on time, (9,5.3%) have received their water bills on time once since they were connected with water, this implies that the majority of the respondents might have failed to clear their water bills on time due to bills delay hence digitization will strive to solve the delay of water bills since the consumers will access their water bills instantly from their portals.

6. CONCLUSION

In conclusion, the attainment of transparency and track keeping of the rate of water consumption will enhance consumers' confidence and trust hence the study sought to examine the level of transparency and satisfaction of the consumers on the existing manual billing system, hence digitization of water billing and consumption was found to be the solution for the current inconveniences associated with water billing and consumption like track keeping of the payment and consumption rates. The prototype system was developed to enable the consumers to keep track of the consumption rates by granting the consumer to view water ratings and previous consumption and payment history.

The timeliness of operational and managerial goals is a key indicator of success. From the study findings, the average time needed to prepare the water bill of one customer till final dissemination is approximately five minutes hence a minimum of 1500 minutes must serve all the 300 available consumers, hence through the adoption and implementation of ICT, this can be improved by serving more than 10 consumers within the average timing of a single consumer on a manual process. ICT integration of water billing will promote the effectiveness and convenience of service delivery. The developed prototype of the water billing and consumption system enables the staff to record meter readings of the consumers to the system and automatically the water bills are processed and made available on the consumer's portal, hence minimizing the time taken to meet the operational and managerial goals.

An adaptive computer system that suits the user's expectations and task domain will enhance usability and acceptance of the system for implementation, thus increasing performance expectancy per unit of time. Reduction of effort expectancy needed by the end-user of the system will enhance convenience for the users. Thus, a good user interface and supportive system that allows users to use the system evenly is more acceptable. The ability that a system enables both the novice and expert, both those with internet-enabled devices and those without, to use the system evenly to achieve the basic critical tasks without strain determines the success of the system.

7.   RECOMMENDATIONS

From the research findings, the researcher recommended the followings:

(i)   The establishment of a policy framework that aims at the protection of consumer integrity to eliminate the chances of cyber victimization. The research findings indicate that the majority of the consumers are computer illiterate hence chances of cyber victimization are higher thus a control policy framework that will deal with deliberate and un-deliberate cyber intrusion by unauthorized personnel into the system will grant customers integrity.

(ii)   The incorporation and integration of water leakage detestation systems to avoid water wastage.

(iii)   Since not all respondents recorded ownership of internet-enabled devices, further study, and system design need to be done to fully deploy USSD capabilities to enable support of all users to use the system.

8.   ACKNOWLEDGEMENTS/FUNDING

9.   CONFLICT OF INTEREST STATEMENT

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

10.   AUTHORS' CONTRIBUTIONS

Cosmas Knowen: Conceptualization, methodology, investigation, writing-original draft, and formal analysis; **Stephen Oloo**: methodology, supervision, writing-review, and editing; **Lamek Ronoh**: Writing-review and editing, and Validation; **Abel N. Mokua:** formal analysis, and Writing-review.

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