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Navigating Competitive Pressures: Strategies for Water Service Providers in Kenya to Thrive in the 21st Century

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Abstract: This investigation explored the challenges faced by water service providers in Kenya amidst intensifying competitive pressures in the 21st century. With increasing demands for access to clean and reliable water, coupled with evolving regulatory frameworks and technological advancements, water providers are under growing pressure to adapt and thrive in a competitive environment. The research aimed to identify key strategies thattheWater Service Providers (WSPs)in Kenya can employ to manage the competitive pressures brought about by the 21st Century challenges. By analyzing the strategies such as;strategies to reduce None Revenue Water (NRW), customer expectation strategies, meeting regulatory requirement strategies, and strategies for the adoption of technological innovations. The study sought to uncover effective strategies for maintaining competitiveness and delivering quality services. Utilizing descriptive survey research design, the research aimed to provide practical insights and actionable recommendations for water service providers in Kenya. The investigation established that the four strategies used by WSPs in Nakuru County Kenya had positive significant effect 21st Century competitive pressure. The findings therefore will contribute to the development of strategic interventions and policy recommendations to support the resilience and growth of water service providers in Kenya. Ultimately, the research aims to ensure sustainable access to clean water for all Kenyan citizens while fostering innovation and efficiency in the water sector.

I. Introduction

Water is crucial for sustainable economic growth and the continuation of human civilization (Zucchinelli, Spinelli, Corrado&Lamastra, 2021). Forecasts indicate a 50% surge in global water demand by 2025 (Alshehri, Bhardwaj, Kumar, Mishra &Gyani, 2021), with over 65% of the world's population likely to encounter water scarcity soon (Raheli, &Yazdanpanah, 2020). Although water is a fundamental necessity, WHO (2022) has verified that more than 2 billion people worldwide lack access to this vital resource, rendering them susceptible to socioeconomic hardship. A report published on the WHO website in March 2022 highlights that over 2 billion individuals reside in countries facing water scarcity, a situation expected to worsen in certain regions due to climate change and population growth (WHO, 2022). Additionally, on a global scale, at least 2 billion people utilize drinking water sources contaminated with fecal matter.

In Africa, 418 million individuals continue to lack access to even the most basic drinking water services, while 779 million lack basic sanitation facilities, including 208 million who still resort to open defecation. Moreover, 839 million people lack access to basic hygiene services (UNICEF, 2022). The failure of numerous stakeholders to effectively implement water and sanitation projects, whether at the community or urban level, is attributed to various factors such as inadequate resources, limited adoption of suitable technology, governance issues, corruption, and deficient project management skills (World Bank, 2020). These challenges ultimately undermine the sustainability of projects and hinder overall sustainable development efforts.

Kenya faces water scarcity issues, with only 647 cubic meters of renewable fresh water per capita. The country experiences high variability and extremes of droughts and floods. Water resource degradation imposes a significant macroeconomic burden on Kenya's economy, impacting many citizens' quality of life and threatening long-term economic development. Poor planning, mismanagement of water resources, and lack of technical expertise contribute to recurrent water shortages. Despite abundant water resources, many water projects in Kenya are established for commercial purposes, often extracting underground water. However, these projects frequently fail to achieve sustainability due to issues such as inadequate integration and utilization of modern technology in planning, execution, and management (WHO, 2022).

Non-revenue water (NRW) loss poses a major obstacle for both the water sector and global communities, as decreasing NRW translates to increased water availability for distribution and financial savings. For example, reducing commercial losses enhances billing accuracy, thereby generating substantial new revenue. Similarly, minimizing physical or real losses enables utilities to defer investments needed for water source development projects (Farouk, Rahman &Romali, 2023). Similar to many other regions globally, Kenya is experiencing a gradual increase in water scarcity due to the depletion of water sources, primarily attributed to population growth and the effects of global warming. Presently, approximately 56% of the population in the country has access to safe water, with 65% of this coverage concentrated in urban areas. However, urban areas fare better in terms of sewerage coverage, with only 22% having access to adequate sewerage systems (Alima, 2020).

Reducing non-revenue water presents a key strategy for managing costs associated with addressing water scarcity. This approach not only enhances coverage but also allocates more funds towards maintenance, operations, and system renewal in water supply. Despite efforts, Kenya continues to grapple with a persistently high average non-revenue water rate, currently estimated at 42%. Consequently, the country suffers an annual loss of approximately Ksh 10 billion due to non-revenue water-related losses. If this trajectory remains unchanged, projections indicate a potential loss exceeding Ksh 150 billion by 2030, posing a significant threat to the sustainability of Kenya's water sector. To mitigate this risk, the Government, through the Ministry of Water and Irrigation, aims to reduce non-revenue water from the current level of 42% to below 10% by 2030. Figure 1.1 illustrates the trend of non-revenue water from the financial year 2007/2008 to 2013/2014, as documented in the impact report released by the Water Services Regulatory Board (Alima, 2020).

Examining customer satisfaction is crucial for driving performance enhancements across all service providers, including government-owned entities responsible for essential services like water supply. Water is a fundamental necessity and a basic human right, serving various domestic needs such as drinking, cooking, sanitation, and irrigation. Additionally, beyond household usage, water plays a vital role in supporting diverse livelihoods, including livestock rearing, gardening, crop cultivation, food processing, aquaculture, and fisheries (Soussan 2018; Kopper et al. 2019).

Secondly, customer satisfaction holds paramount significance in driving performance enhancements for service providers, including government-owned organizations responsible for vital services like water supply. Access to improved levels of sanitation and water supply is indispensable for human health, as well as for ensuring people's convenience and dignity. Generally, it is anticipated that higher service quality will result in increased customer satisfaction, leading to improved customer loyalty and ultimately higher profits (Chen and Hu, 2018).According to Mutua and Gitonga (2022), in 2016, the Water Act was introduced, replacing the previous legislation from 2002. One significant provision of this act was the establishment of regulatory bodies known as Water Services Regulatory Boards (WSRBs). These boards are responsible for overseeing water service management within their designated areas. One of their key roles is to license service providers operating within their jurisdiction. This licensing requirement is aimed at promoting universal access to water within their areas of authority. Consequently, WSRBs are tasked with developing effective strategies to fulfill their mission, as outlined in the WASREB Strategic Plan for 2018-2022.

The National Water Services Strategy spanning from 2007 to 2015 aimed to ensure that water provision is both affordable and equitable while maintaining efficiency and effectiveness. A primary objective was to enhance sustainable access to safe water, targeting an 80% coverage rate by the year 2015. As outlined in the WASREB Strategic Plan for the period 2018-2022, the provision of water services serves as a foundational element for achieving the goals of the national government's development agenda, commonly referred to as the Big Four Agenda. Consequently, WASREB's strategies must align with and support these overarching pillars. It is important to recognize that the responsibility for water service provision is shared between the national and county governments. Consequently, WASREB acknowledges that various factors such as political cycles, technological advancements, socio-cultural dynamics, and legal frameworks can impact the delivery of water services. Therefore, the strategies devised by WASREB must account for and navigate through these environmental challenges to ensure effective water provision (Mutua&Gitonga, 2022).

II. Theoretical Review

2.1Expectation Confirmation Theory

The investigation was underpinned by Expectation Conformation Theory by Richard L. Oliver in 1977 and 1980. The theory of expectation confirmation revolves around four key elements: expectations, perceived performance, belief disconfirmation, and satisfaction. Expectations represent the anticipated attributes or qualities that an individual expects

to be associated with a product, service, or technological item. These expectations directly impact both the perception of performance and the confirmation or disconfirmation of beliefs. Moreover, they indirectly influence satisfaction after purchase or adoption through the mediating factor of belief disconfirmation. Expectations formed before purchase or adoption serve as a benchmark against which the product, service, or technological item is evaluated in the end. This theory was used to analyze the effect of customer expectation strategies on managing the 21st Century competitive pressures by WSPs in Nakuru County, Kenya.

The study is also underpinned by Public Interest Theory by Guerin (2003). The theory of public interest suggests that regulation is driven by the demands of the public and serves to address market failures, thereby promoting economic efficiency. The theory suggests that regulation is necessary to address inefficiencies and inequalities in service provision by ensuring it aligns with public demands. It operates under the premise that service provision tends to be inefficient and inequitable if left unregulated (Glaeser&Shleifer, 2003). Regulation involves the formulation and enforcement of policies, standards, guidelines, and plans to ensure that services benefit society as a whole rather than serving the selfish interests of specific individuals or groups (Armstrong & Sappington, 2007). In this study, the theory was employed to examine the nature of regulation governing the management of water resources and service delivery, as well as the provisions within related Acts aimed at serving the public interest. This theory underpinned the effect of Strategies to reduce None Revenue Water (NRW), meeting regulatory requirement strategies and strategies for the adoption of technological innovations on managing the 21st Century competitive pressures by WSPs in Nakuru County, Kenya.

2.2 Empirical Review

2.2.1 Strategies for Maximizing Revenue Collection

The research conducted by Nedelescu, Horhotă, and Matei (2021) underscores the significance of automation within revenue administration. It asserts that the automation of tax procedures constitutes a crucial stride towards enhancing tax efficiency and fostering public investment.Ngolo and Kidere (2020) examined the approaches employed by Water Service Providers in Kenya to mitigate Non-Revenue Water (NRW). High levels of NRW significantly impact the financial viability of numerous WSPs in the country. The study aimed to identify the NRW reduction strategies utilized and assess the extent of their implementation. Employing a mixed methods approach, the research employed stratified random sampling to select 61 companies from a total of 81 active water companies in Kenya. The research design combined descriptive and analytical elements. Data collection involved the distribution of a semi-structured questionnaire online to gather both qualitative and quantitative data, subsequently analyzed using SPSS. Additionally, a reliability test was conducted on the research instruments using factor analysis.

The study reviewed four theories, with a focus on the Managerial Efficiency Theory and the Theory of Constraints. The results confirmed the utilization of all NRW reduction strategies by water companies in Kenya, with certain strategies being more prevalent than others. Furthermore, the findings highlighted various challenges hindering the full implementation of NRW reduction strategies. Recommendations included the allocation of sufficient resources and prioritization of NRW reduction activities by management, the development of policies and procedures to facilitate implementation, leveraging technology, and ensuring that budgetary processes encompass all NRW reduction strategies.

Siyumbelo and Hampwaye (2022) examine the levels of non-revenue water in water service provision in Livingstone and evaluate the management approaches used to address it. The research reveals that during the study period (2018-2021), non-revenue water in Livingstone's SWSC averaged at 43%. This reduction in non-revenue water is attributed to various interventions, such as mapping the water distribution system, improving response time to leaks, replacing old pipes, engaging with the community, and segmenting the network into District Metered Areas. However, the study also highlights that certain effective practices for reducing non-revenue water remain unimplemented due to the absence of a dedicated entity to tackle this issue. This study was conducted in South Africa compared to the current investigation carried out in Kenya.

Alima (2020) examined the factors contributing to non-revenue water in Kenya, focusing on a case study of the Meru Water Supply Scheme, recognized as one of the best-managed systems in the country. The study findings identified various organizational practices as significant contributors to high non-revenue water, including operation and maintenance techniques, repair methodologies, connection and disconnection procedures, absence of as-built drawings, illegal connections, and organizational culture. Evaluation of the water balance indicated that the revenue water volume accounted for 83%, with approximately 83% attributed to billed metered consumption and no billed unmetered

consumption. The remaining 17% constituted non-revenue water volume, comprising leakage from water mains, tank overflow, service pipe leakages, apparent losses at 2.3%, and metering inaccuracies at 1.5%. This study though carried out in Kenya, the location was in Meru County.

2.2.2 Meeting Customers Expectation Strategies

Lyimo and Gindo (2022) investigated the provision of water supply and sanitation services and its impact on customer satisfaction within the Arusha Urban Water Supply and Sanitation Authority in Tanzania. Their research unveiled meaningful connections between the costs associated with water supply and sanitation services and customer satisfaction. Additionally, they found that the accessibility of these services also plays a crucial role in determining customer satisfaction levels. Furthermore, their study highlighted the importance of the reliability of water supply and sanitation services in influencing customer satisfaction. This study was conducted intanzania compared with the current study conducted in Kenya.

Ohwo and Agusomu (2018) conducted a study on how residents in Ojota perceive the quality of public water services. They found that, according to their analysis, the Customer Satisfaction Index (CSI) stood at 2.54 out of 5, indicating a moderate level of satisfaction among residential customers. Moreover, only 12.21% of customers expressed a willingness to pay for water, signaling dissatisfaction with the services provided by the Lagos Water Corporation (LWC). This study was conducted in Lagos Nigeria compared to the current study carried out in Kenya.Ojo (2019) devised and tested a model framework for assessing customer satisfaction with public water utilities in Nigeria. Their research focused on service quality as perceived by customers, aiming to identify areas for improvement. Results from the study revealed an overall CSI of 73.4%. Customers residing on the outskirts of the FCT expressed the lowest minimum CSI at 63%, indicating lesser satisfaction with the service quality provided by the FCT Water Board. Conversely, medium and low-density areas reported a higher minimum CSI of 71%. Notably, among the factors influencing satisfaction, the reliability of water supply emerged as the most significant predictor, accounting for 67% of the variance in overall customer satisfaction and thus highlighting its importance in determining service quality. This was another investigation carried out in Nigeria compared to the current study carried out in Kenya.

Philip and David (2020) conducted an assessment of the Household Water Service Level provided by a private water enterprise in Ghana. Using a quasi-experimental approach, they employed key informant surveys, household surveys, and water quality testing to examine the service quality received by households under different management schemes. They compared service indicators through logistic regression analysis. Their findings revealed that the majority of customers are dissatisfied with the water service primarily due to its unreliability, absence of standby maintenance teams, and lack of technological innovation. The study emphasizes the importance for policymakers and implementers to promptly address customer needs and preferences. This study was carried out in Ghana compared to the current study carried out in Kenya.Kinisa (2019) demonstrated that customers perceive the cost of water to be fair because they are charged based on their actual usage, as reflected in meter readings and billing. Additionally, the study identified certain wards like Muriet and Olasiti where communities have established their own water sources and distribution systems. Caroline (2019) highlighted the challenges facing water supply and sanitation in Tanzania, including declining access to improved water sources, particularly in urban areas, consistent access to some form of sanitation, intermittent water supply, and generally poor service quality. Many utilities struggle to cover their operational and maintenance costs due to low tariffs and inefficiencies. This was another investigation carried out in Tanzania compared to the current study carried out in Nakuru County in Kenya.

2.2.3Regulatory Requirements Strategies

Mutua and Gitonga (2022) conducted an analysis of the organizational elements and their impact on strategy implementation within public water service providers in Kitui County. The research revealed that organizational leadership, structure, and culture significantly influenced the execution of strategies in these entities. The findings suggest that effective organizational leadership plays a crucial role in guiding employees towards fulfilling the organization's mission. This involves aligning employees' strengths with the organization's mission, devising a strategic plan accordingly, setting and implementing goals, and ensuring team accountability within specified timelines. Additionally, organizational structure plays a vital role in garnering consensus for strategies, determining management stakeholders, and delineating power dynamics. Moreover, organizational culture fosters goal alignment by prioritizing productivity and the achievement of the organization's core mission. This study was conducted in Kitui County, Kenya compared to the current study carried out in Nakuru County, Kenya.

Trimmer, Qureshi, Otoo, and Delaire (2023) conducted an investigation aimed at understanding the conducive environment necessary for the delivery of inclusive urban water services. Specifically, the study aimed to identify and analyze institutional arrangements, policies, regulations, service delivery methods, financing models, and contextual factors influencing advancements in this domain. The research revealed a diverse array of characteristics that support the provision of safe and inclusive water services, necessitating contextually appropriate strategies tailored to existing institutional frameworks, infrastructure, and socio-economic, political, and environmental circumstances.

The findings illustrated three distinct types of progress in the studied cities: utility-driven, regulator-supported, and municipality-driven, each characterized by unique features and drivers of success. Additionally, the researchers identified 12 key characteristics constituting the enabling environment across all three progress types. These characteristics underscored two overarching themes. Firstly, the presence of a well-functioning water service provider often served as a fundamental requirement for achieving inclusive and pro-poor service delivery. Elements such as clearly defined performance metrics, mechanisms for gathering customer feedback, and sustainable financing strategies for operational costs were found to contribute significantly to the success of cities in this regard. Secondly, the provision of inclusive water services often necessitated explicit pro-poor policies and strategies, such as removing land tenure requirements for piped connections and engaging communities in participatory decision-making processes.

Korir (2020) conducted an analysis of the regulatory and institutional framework governing the water sector between 2002 and 2017. The study revealed that this framework establishes institutions responsible for regulating water resources, providing water services, developing water infrastructure, and managing water harvesting and storage, as well as financing water services. Each institution is assigned specific roles, aiming to uphold principles of participation, accountability, and tariff setting. However, despite these efforts, deficiencies persist, including gaps in the regulation of certain institutions, role overlaps, and a lack of coordination mechanisms among them. Challenges related to funding, regulation, and coordination were also identified. Consequently, the study recommends several measures to address these issues, including the implementation of coordination mechanisms, clarification of institutional roles, regulation of entities involved in water infrastructure, and the development of mechanisms to involve County Governments in matters directly concerning them within the Water Act.Korir (2020) study did not analyze the regulatory strategies and competitive pressure which was one of the objectives of the current investigation.

Kirui and Ngugi (2014) found that the existing legal framework needs revision. A significant flaw of the Water Act 2002 is its lack of operational rules, leading to challenges in enforcement. Consequently, regulatory effectiveness, particularly of Wasreb, is influenced by legislation. The study also highlights the impact of funding on Wasreb'sperformance within the water services sub-sector, where increased funding enhances institutional services and operational efficiency. However, it suggests that the regulatory levy requires reassessment to further enhance Wasreb's services. Moreover, effective revenue allocation and project prioritization are crucial for improving service delivery and revenue generation. Low staffing levels, particularly within Wasreb, contribute to insufficient inspections of water service providers (WSPs) and water service boards (WSBs), thereby affecting performance reporting by Wasreb.

Adom (2020) examined public policies and programs concerning water security in post-apartheid South Africa. The findings indicate that while the country has implemented numerous policies and programs aimed at enhancing water security, they fall short in addressing challenges such as municipal pollution, funding gaps, and the establishment of a smart water economy. Consequently, the study suggests the establishment of an independent water regulator to coordinate various government departments, including the National Treasury, to bolster governance capacity, attract private investment, and address fiscal deficits in the water sector.Adom (2020) study was conducted in South Africa compared to the current study carried out in Kenya.

2.2.4 Strategies for the Adoption of Technological Innovations

Otundo (2022) investigated the relationship between Strategic Technology Adoption Practice and the sustainability of Community Water Supply Projects in marginalized areas of Kenya. The study found a positive and fair correlation between strategic technology adoption practice and project sustainability. The coefficient of determination (R2) was 0.114, indicating that strategic technology adoption practice explains 11.4% of the variations in project sustainability. The results of significance testing revealed that strategic technology adoption practice (β=0.151, p=0.000) was statistically significant at $p < 0.05$ and 95% confidence level. The overall F statistics ($F = 2.387$, $p=0.000<0.05$) demonstrated a highly significant relationship between strategic technology adoption practice and project sustainability. Therefore, the null hypothesis was rejected, and the alternative hypothesis accepted, indicating that strategic technology adoption practice

significantly influences the sustainability of community water supply projects in marginalized areas of Kenya.Otundo (2022) study did not analyze the innovation with competitive pressures WSPs face in kenya which was one of the objectives of the current investigation.

Verma, Verma, Verma, Singh, and Bisen (2024) conducted a review on Indian rural development, focusing on the relationship between technology and society. India, with a significant rural population, experiences disparities in development across regions due to cultural practices, varying living standards, and disparities in land ownership. Addressing these disparities necessitates the adoption of technology and the provision of quality education. The study emphasizes the interconnectedness of society, technology, and development in rural India. It suggests that technology-driven initiatives can play a vital role in poverty reduction by providing access to education, healthcare, financial services, and employment opportunities for underprivileged communities. Furthermore, the study proposes that combining technological innovation with traditional knowledge can enhance agricultural practices and improve the economic conditions of farmers. This study was carried out in India which is middle level economy compared to Kenya which is a developing economy.

Henlely (2021) conducted research focused on new water technologies aimed at addressing global sustainability challenges. The study, a policy-oriented document, drew upon practical experiments carried out by various tech firms implementing diverse water projects. Among the technologies highlighted in the research are; Nanotechnology in filtration: Researchers in India have developed a water purification system utilizing nanotechnology. This innovative approach involves composite nanoparticles that emit silver ions, effectively removing microbes, bacteria, and other contaminants from water. Membrane chemistry: Advances in membrane chemistry contribute to improved water treatment processes. Seawater desalination: Technologies for desalinating seawater offer potential solutions to water scarcity issues. Smart monitoring: Implementation of smart monitoring systems can help address water loss issues, with an estimated 45 million cubic meters lost daily in distribution networks in developing countries.

Qiao, Fang, and Mu (2020) conducted a study titled "Assessing the Effects of Advancements in Water Resource Technology on Development and Economic Growth in Northwest China." Utilizing panel data from 1996 to 2017 and employing the stochastic production frontier model, the research focused on Northwest China. The findings indicated that advancements in water technologies have indeed contributed to increased GDP growth. However, the study also noted that the current level of water technologies is not the primary factor in addressing the constraints related to water resources and the sustainability of water projects in the region. Furthermore, water scarcity continues to limit economic growth in Northwest China, with advancements in water science and technology serving as the driving force behind all water technologies. Finally, the rate of advancement in water science and technology tends to slow as water consumption increases, and the influence of water technical efficiency on economic growth varies depending on the water institutions in different areas. This study was conducted in China compared to the current study conducted in Kenya.

Tonga (2020) conducted research on the impact of technology on the sustainability of rural water supply systems. The study highlights that in numerous developing nations like Tanzania, policies regarding rural water supply have been inadequately executed. Over time, public sector entities in Tanzania have encountered challenges related to weak corporate governance in decision-making and the implementation of sustainable and high-quality water services. Additionally, the lack of effective participation between external actors (donors, agencies) and local actors (local communities) hinders the sustainability of rural water supply projects despite advancements in water technology. Tonga (2020) study was conducted in Tanzania compared to the current study carried out in Kenya.

Ivongo and Chege (2019) conducted a study investigating the impact of information technology on the performance of water projects in Makueni County, Kenya. The researchers opted for a descriptive research design, which allows for the integration of both quantitative and qualitative approaches. The findings revealed that electronic procurement had a positive and significant influence on the performance of water projects in Makueni County. Additionally, the study identified that electronic record management also had a positive and significant effect on project performance in the same county. Despite the abundance of fresh water on the planet, access to clean, safe, and reliable water remains a challenge for millions of people worldwide due to inadequate infrastructure. This study did not analyze the effect of technology and innovation on competitive pressures the WSPs in Kenya face.

III. Methodology

The study adopted descriptive survey design to investigate the navigation of competitive pressures: strategies for water service providers in Kenya to thrive in the 21st century because it involves an in-depth explanation of a situation (Siedlecki, 2020). The study was conducted among the managers working in the three Water Service Providers in Nakuru County, Kenya; Nakuru Water and Sanitation Company (NAWASSCO), Naivasha Water and Sanitation Company (NAIVAWASSCO) and NakuruRural Water and Sanitation Company (NARUWASSCO) – (See Figure 1).

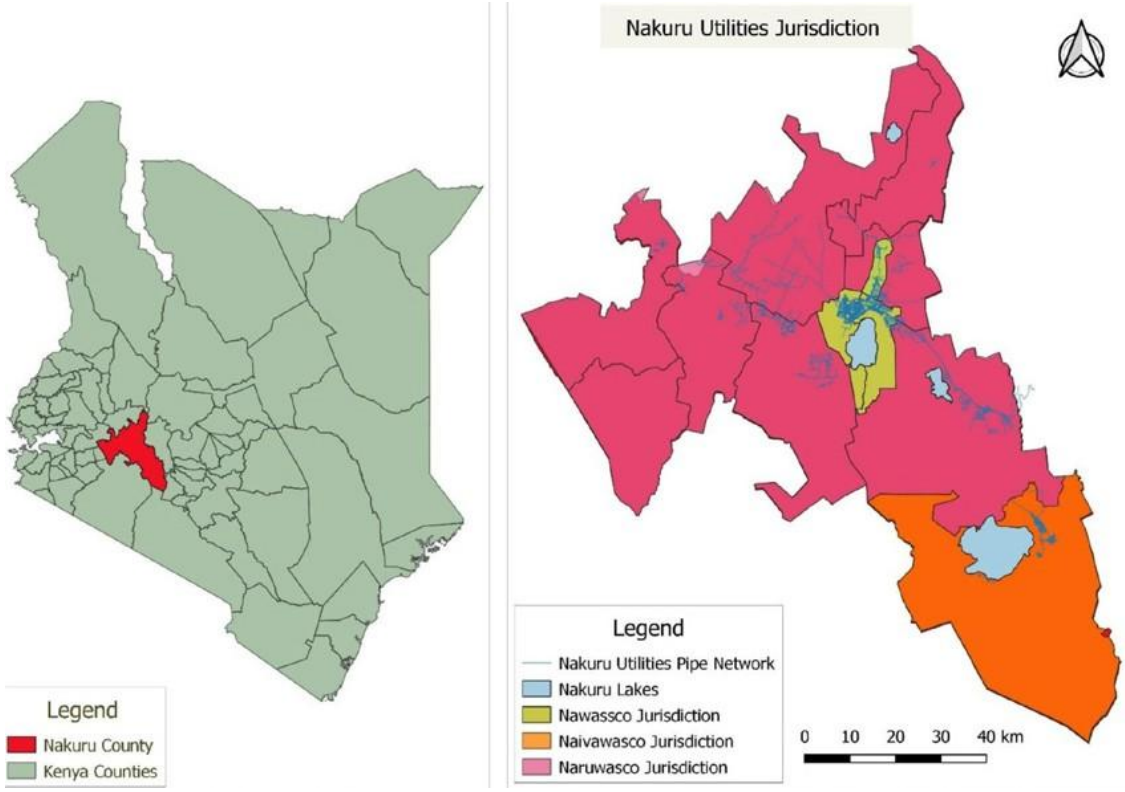

Figure 1: Jurisdiction of WSPs in Nakuru County.

The target population were the 103 supervisors and managers working for the three WSPs in Nakuru County. The choice of the target population wa based on the fact that these supervisors and managers working in the WSPS are faced with daily pressurs that they have to manage in order to make their water utilities survive the 21st century challenges. The supervisors and the managers have to develop strategies to handle these challenges including; strategies to reduce None Revenue Water (NRW), customer expectation strategies, meeting regulatory requirement strategies, and strategies for the adoption of technological innovations which were of interest to the investigation.

The researcher sampled 103supervisors and managers working for the WSPs using the sampling formula for small populations Nassiuma (2000) recommendation of a coefficient of variance of 21 to 30% and a standard error of 2 to 5% is generally appropriate.

$$S = \frac{N(Cv)^2}{(Cv)^2 + (N-1)e^2}$$

Where S = the sample size
N = the population size
Cv = the Coefficient of Variation
e = standard error
Therefore, the sample size is:

$$S = \frac{103\,(0.21)^2}{(0.21)^2 + (103-1)\,0.02^2} = 53.50177 \approx 54 \text{respondents}$$

Using a sample size of 54 for the supervisors and managers of the WSPs in Nakuru County, Kenya is a practical approach to gather data for the study. The researcher ensured a representative sample by using simple random sampling. To implement simple random sampling, the researcher assigned a unique identifier to the supervisors and managers. Randomization technique to select the desired number of participants from each stratum (Fraenkel&Wallen, 2000) was achieved.

The study used structured questionnaire as the main data collection tool. Questionnaire is appropriate in a survey research because it is simple to administer and ease for the respondents to score on a 5 point Likert Scale which is easy to analyze (Cohen, Manion, and Morrison, 2007). Structured Questionnaire is also useful in obtaining consistency across the respondents (Denscombe, 2007).The combination of the four competitive strategies for water service providers in Kenya to thrive in the 21st century regression. For quantitative procedures examining the relationship between independent and dependent variables, the following regression models was used:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

Where;
Y = Competitive Pressure
α =constant
$\beta_1 \ldots\ldots \beta_4$= Regression Coefficients
X_1= Strategies to reduce None Revenue Water (NRW)
X_2= Customer expectation strategies
X_3= Meeting regulatory requirement strategies
X_4= Strategies for the adoption of technological innovations

ε = the error term.

IV. Results

4.1 Test for Correlation

Correlation testis a test that indicates how strongly a pair of variable is correlated. This test was carried out using the Pearson correlation and results presented in the table below.

Table 1: Competitive Pressures and Strategies

Variable	CPr	NRW	CEP	RRS	ATI
CPr	1.0000				
NRW	0.5500	1.0000			
CEP	0.2254	-0.1557	1.0000		
RRS	0.8133	0.4869	-0.0149	-0.0453	1.0000
ATI	0.6120	0.7962	-0.1350	-0.4476	0.5990	1.0000

Results from Table 2 indicated that the adoption of technological innovations had the highest correlation with the 21st century competitive pressures faced by the WSPs in Nakuru County (r= 0.8133) followed with the adoption of technological innovations (r = 0.6120), followed with None Revenue Water (r= 0.5500). The adoption of technological innovations had an average correlation of (r = 0.2254). Overall, these correlations provide insights into the relationships between various strategies by the WSPs in Nakuru County to manage the 21st Century pressures in their mandate of increasing access to clean drinking water for domestic use by their customers. WSPs can implement programs to promote water conservation among consumers through education campaigns, leak detection, and repair initiatives, and the promotion of water-saving technologies like low-flow fixtures. The WSPs in Nakuru County should engage with local communities to understand their water needs, concerns, and preferences, and involving them in decision-making processes related to water management and service delivery. Adopting modern technologies such as smart metering systems, remote monitoring, and predictive maintenance tools to enhance operational efficiency, identify issues proactively, and improve customer service can reduce the 21st century pressures the WSPs are current facing in the provision of clean and safe water to their customers.

4.2 Strategies WSPS use to Manage the 21st Century Pressures

Table 2 : Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.782[a]	.612	.606	.34740

Results from Table 2 revealed that the R value was 0.782 whereas R Square was 0.612, which indicated a high degree of correlation. The R^2 value indicates how much of the dependent variable, "Competitive Pressures", was explained by the independent variables, "strategies used by the WSPs in managing the provision of clean and safe water to their customers". In this case, 61.2% was the R Squared, which was large indicating high degree of correlation.

Table 3: ANOVA of Competitive Pressures and the Strategies

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	38.092	3	12.697	105.210	.000[b]
	Residual	24.137	200	.121		
	Total	62.229	203			

The Predictors: "strategies to reduce None Revenue Water (NRW), customer expectation strategies, meeting regulatory requirement strategies, and strategies for the adoption of technological innovations". The dependable variable: "Competitive Pressures". Table 3 indicated that the regression model predicted the outcome variable significantly with p=0.000, which was less than 0.05, and indicated that; overall, the model statistically and significantly predicted the outcome variable. The implication of this finding was that the data collected for the study had high correlation between the independent variables (strategies to reduce None Revenue Water (NRW), customer expectation strategies, meeting regulatory requirement strategies, and strategies for the adoption of technological innovations) and dependent variable (competitive pressures).

Table 4: Competitive Pressures and the Strategies used by WSPS

Sub-Variables	B	t	Sig.
(Constant)	0.751	-8.752	0.000
Strategies to reduce None Revenue Water (NRW)	0.566	9.645	0.000
Customer expectation strategies	0.516	8.762	0.000
Meeting regulatory requirement strategies	0.441	9.339	0.000
Strategies for the adoption of technological innovations	0.406	-8.86	0.000

Table revealed that strategies to reduce None Revenue Water (NRW)had positive and significant effect on 21st century competitive pressures by the WSPs in Nakuru County, Kenya ($\beta = 0.566$, p=0.000). This finding therefore indicated that Strategies to reduce None Revenue Water (NRW) can predict the 21st century competitive pressures by the WSPs. The implication of this finding therefore indicated that change in strategies to reduce None Revenue Water (NRW) by 1 unit will lead to 0.566 multiple units on 21st century competitive pressures by the WSPs in Nakuru County, Kenya. This finding is supported by byNedelescu, Horhotă, and Matei (2021) who underscored the significance of automation within revenue administration and asserted that the automation of tax procedures constitutes a crucial stride towards enhancing tax efficiency and fostering public investment.

Secondly, the study establish that customer expectation strategies had positive and significant effect on 21st century competitive pressures by the WSPs in Nakuru County, Kenya ($\beta = 0.516$, p=0.000). This finding therefore indicated that customer expectation strategies can predict the 21st century competitive pressures by the WSPs. The implication of this

finding therefore indicated that change in customer expectation strategies by 1 unit will lead to 0.516 multiple units on 21st century competitive pressures by the WSPs in Nakuru County, Kenya. This finding is supported by Lyimo and Gindo (2022) who established connections between the costs associated with water supply and sanitation services and customer satisfaction. Additionally, they found that the accessibility of these services also plays a crucial role in determining customer satisfaction levels.

Third, the study establish that meeting regulatory requirement strategies had positive and significant effect on 21st century competitive pressures by the WSPs in Nakuru County, Kenya (β = 0.441, p=0.000). This finding therefore indicated that meeting regulatory requirement strategies can predict the 21st century competitive pressures by the WSPs. The implication of this finding therefore indicated that change in meeting regulatory requirement strategies by 1 unit will lead to 0.441 multiple units on 21st century competitive pressures by the WSPs in Nakuru County, Kenya. This finding is supported by Trimmer, Qureshi, Otoo, and Delaire (2023) who established that utility-driven, regulator-supported, and municipality-driven, each characterized by unique features and drivers of success served as a fundamental requirement for achieving inclusive and pro-poor service delivery.

Finally, the study establish that strategies for the adoption of technological innovations had positive and significant effect on 21st century competitive pressures by the WSPs in Nakuru County, Kenya (β = 0.406, p=0.000). This finding therefore indicated that strategies for the adoption of technological innovations can predict the 21st century competitive pressures by the WSPs. The implication of this finding therefore indicated that change in strategies for the adoption of technological innovations by 1 unit will lead to 0.406 multiple units on 21st century competitive pressures by the WSPs in Nakuru County, Kenya. The result is supported by Otundo (2022) who established a highly significant relationship between strategic technology adoption practice and project sustainability. The finding is further supported by Qiao, Fang, and Mu (2020) who established that the current level of water technologies is not the primary factor in addressing the constraints related to water resources and the sustainability of water projects in the region.

V. Conclusions

The main aim of this investigation was to navigatecompetitive pressures: strategies for Water Service Providers in Kenya to thrive in the 21st Century. Particularly, the study examined the effect of; strategies to reduce None Revenue Water (NRW), customer expectation strategies, meeting regulatory requirement strategies, and strategies for the adoption of technological innovationscompetitive pressures by Water Service Providers in Kenya to thrive in the 21st Century. The investigation established that the four strategies used by WSPs in Nakuru County Kenya had positive significant effect 21st Century competitive pressure.The findings underscore the pivotal role of strategic foresight and adaptability in the operational frameworks of WSPs, particularly in a dynamic environment characterized by evolving customer demands, stringent regulatory requirements, and technological advancements. By proactively addressing issues such as NRW reduction, aligning with customer expectations, adhering to regulatory standards, and leveraging technological innovations, WSPs in Nakuru County have demonstrated their resilience and capacity to thrive amidst competitive pressures.

Recommendations for Policy, practice and Further Studies

The results from the investigation carry profound implications for the broader water sector in Kenya and beyond, emphasizing the imperative for WSPs to embrace a multifaceted approach to competitiveness. By embracing strategic initiatives that encompass operational efficiency, customer-centricity, regulatory compliance, and technological advancements, WSPs can position themselves not only to withstand contemporary challenges but also to capitalize on emerging opportunities in the dynamic landscape of the 21st Century. Thus, the findings of this investigation serve as a clarion call for continued strategic innovation and adaptation within the water sector, heralding a future where WSPs can navigate competitive pressures with confidence and efficacy.

WSREB should develop and implement programs aimed at enhancing the capacity of Water Service Providers (WSPs) in Nakuru County, Kenya, to effectively implement the identified strategies. This could include training sessions, workshops, and knowledge-sharing platforms focusing on NRW reduction techniques, customer service improvement, regulatory compliance, and technological adoption. Facilitate the adoption and integration of innovative technologies within the operations of WSPs in Nakuru County. This could involve providing incentives, subsidies, or grants to WSPs

to invest in advanced technologies for water management, leak detection, metering systems, and customer engagement platforms.

The investigator also recommends that WSREB should review and strengthen existing regulatory frameworks governing the water sector in Nakuru County to ensure alignment with the identified strategies. This may include revising regulations related to NRW reduction targets, customer service standards, and incentives for technological innovation. In order to expand knowledge on this topic , Water Sector Stakeholder bodies should facilitate collaboration among WSPs, government agencies, academia, and other stakeholders to foster knowledge sharing and best practices exchange. Establish platforms such as forums, conferences, and working groups to facilitate dialogue, collaboration, and mutual learning among stakeholders in the water sector. They should also launch public awareness campaigns to educate residents of Nakuru County about the importance of water conservation, NRW reduction, and the role of WSPs in ensuring sustainable water supply. Encourage community participation in water management initiatives through stakeholder engagement, community forums, and citizen feedback mechanisms.

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