

EFFECTIVENESS OF DEVOLUTION ON SUSTAINABILITY OF WATER SUPPLY IN KENYA: A CASE OF ATHI WATER WORKS DEVELOPMENT AGENCY

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ABSTRACT

Kenya's water industry has experienced a number of reforms, the most recent of which being the adoption of the Water Act 2016 in April 2017. With regard to the provisions of the 2010 Kenyan Constitution that devolve water and sanitation services to county governments, the new law brought national water management and service provision into compliance. In Kenya, the counties that are the owners of the water service providers mandate is providing water services (WSPs). The 2010 Constitution's implementation and effects are still being felt. This study should help us better comprehend how the county's reality is developing. It is crucial to comprehend how well the decentralized systems offer services. The goal of this study is to determine whether devolution has a positive impact on the long-term viability of Kenya's Athi Water's water service providers. Decision-making, management, lobbying, involvement and consensus building, research, and analysis all require careful consideration of sustainability. The Athi Water Works Development Authority's water service providers was the focus in the study's analysis of the effects of devolution on them. Water resource management,

strategies frequently include conflicts. The game theory and resource dependence theory assesses how stakeholder actions, often intended to improve things and create a win-win scenario, can instead make things worse for everyone involved. Cross-sectional survey and descriptive research designs anchor the study. Thirteen Water Services Providers (WSPs), registered and spread out across three counties made up the study's population. Open and closed surveys were the data collection tools. Regression modeling was used in compiling, coding, and evaluating the data gathered from each WSP in order to determine the link between the various variables. Additionally, data presentation will be through means and percentages. The study offer crucial baseline data on the viability of the water service providers' economies under devolution and the extent of the Water Act 2016's repeal. The water service providers anticipate using the study's findings to address sustainability-related challenges.

Key Words: Devolution, Technical Efficiency and Expansion Strategies

INTRODUCTION

The operationalization of governance and service delivery at the most basic level in a given jurisdiction is devolution. Devolution is regarded as the finest method for providing high-quality services during the past 50 years. Due to bureaucracy, generally centralized governance is

regarded as dysfunctional. There must be ongoing scholarly investigation into the efficiency of devolution in service delivery (Goodwin *et al.*, 2005).

One of the most important problems for devolved entities is access to water. Kenya is one of those nations where a lack of water resources and inadequate water infrastructure endanger public health and standard of life while impeding the country's ability to thrive economically and socially (Cherunya *et al.*, 2015). As a result, efforts to reform the nation's water sector and enhance water resource management have a lengthy history. In spite of these efforts, a sizeable portion of Kenya's population still lacks access to enough water for consumption, sanitary needs, and productive uses (Sambu & Tarhule, 2013). This study's goal is to assess how devolution has affected the viability of water service companies. One of the most common buzzwords in the world's policy agenda, including in devolved areas, is sustainability. As a result, there is a strong political push for a thorough evaluation of changes in social, environmental, and economic conditions (Bossel, 1999). According to a WASREB impact analysis from 2007, just 10 WSPs can support operation and maintenance costs, and only three can (GTZ, 2007). The nations of Latin America had centralized governments (Mitchell, 2009). Although other nations, like Brazil, Mexico, and Venezuela, formally retained federalist or regionalist constitutions, on paper, they tended to be federalist, with states and regions essentially serving as administrative divisions. The situation in the former Soviet Union (USSR) was comparable to that in Latin America. On paper, the USSR was a federation of independent states, but in practice it was tightly centralized and run from Moscow.

African nations also had powerful national governments. The municipal government structure in South Africa has always been very centralized. The necessity of enforcing apartheid at the local government level has been a fundamental factor in the development of such a centralized regime. The apartheid regime's traditional tenets were abandoned and some minor adjustments were implemented in the 1980s by the National Party (NP) government. Changes to local government policies and the adoption of new institutions were some of these improvements. Regional Services Councils (RSCs) and Black Local Authorities (BLAs) were established (Cameron, 1995). In the 1980s, one of the main tenets guiding the local government reform was the maximization of power devolution, decentralization of administration at the local level, and minimization of administrative authority over local authorities (Rihoy & Maguranyanga, 2007).

Kenya chose for devolution as a response to a system of highly centralized administration that had allowed for the abuse of power, spatial inequality, and underdevelopment. The establishment of 47 counties following the general elections in March 2013 allowed for the implementation of this system, which was incorporated in the 2010 Constitution. The core of Kenya's new constitutional system is devolution, which offers a way to remedy historical injustices (Steeves, 2015). Every Kenyan person has a fundamental right to access to adequate levels of clean, safe water that meets equitable requirements, according to Article 43 of the 2010 Constitution of

Kenya (CoK) on economic and social rights (Wasonga, 2013). Since it supports the social and economic, health, and environmental sectors, water is also referred to as a social and economic benefit that is crucial to the country's sustainable development. The Constitution mandates that the State and each and every State entity maintain the human rights set forth in the Bill of Rights. This is their primary duty. The state is made up of the national government, county governments, and the organizations that make up the Kenyan government.

The Fourth Schedule of the CoK 2010 mandates the construction of national public water works, whereas the development of county public water works and the supply of water and sanitation services is the responsibility of the county administrations. County governments are required to provide water and sanitation services as well as to carry out certain national government policies on environmental and natural resource protection, including soil and water conservation (Chinwe & Bitteka, 2017). There are shared mechanisms under Article 189 (2) of the Constitution, concurrent functions under Article 6 of the Constitution, or unique tasks whose implementation needs consultation and cooperation. Because of this, each level of government must interpret policy directives in light of its constitutional authority. Consultation, cooperation, and intergovernmental channels will be crucial where joint implementation may be required. The primary topic of 1965's Sessional Paper No. 1 was African socialism. It outlined three priorities: eradicating sickness, ignorance, and poverty. Additionally, it emphasized how crucial watershed preservation and protection are for sustainability. Wide-ranging reforms in Kenya's water and sanitation sector were built on the National Water Policy, Sessional Paper No. 1 of 1999, and the Water Act of 2002.

The Act provided the platform for putting reforms into place that designed to enhance water resources management (WRM) and the sustainable delivery of water supply and sanitation (WSS) services. The management of WSS and WRM in this nation was intended to be significantly impacted by these developments (Sambu & Tarhule, 2013). If not communicated correctly, they also have the potential to lead to political and/or societal resistance. New concerns are addressed by the National Water Policy 2021, which was just adopted. Sustainability has become a widely accepted objective for human society as it has become clear that the viability of human society may be in peril as a result of deteriorating environmental conditions in many parts of the world. Finding appropriate sustainable development indicators for a community, city, region, country, or even the entire world is challenging (Barraque, 2003). It necessitates understanding of what is crucial for the sustainability of the systems involved and how it affects development. Although few in number, the quantity of representative indicators should be as great as necessary. The development, maintenance, and delivery of water and sewerage services are the responsibilities of water service providers, which are geographically grouped under water works development agencies. These water service providers in Kenya were constituted as representatives of the previous water service boards following the passage of the Water Act

2002. Water services were given to the County Governments as a result of devolution (Sambu, 2011).

Kenya adopted a new constitution in 2010 that established a decentralized government structure with 47 county governments. The county governors, deputy governors, and representatives were chosen in the March 2013 elections, which also marked the beginning of county government operations. The oversight of some operations, including the provision of healthcare, water and storm water management, pre-primary education, and upkeep of local roadways, is now the responsibility of these 47 new county governments (Steeves J, 2015). Previously, Kenya's national government was in charge of these. These county governments in turn get a cut of federal funds. Additionally, the county governments are anticipated to raise funds from various sources found inside their own counties, such as taxes on real estate and entertainment.

The adoption and implementation of an integrated water management system have been repeatedly attempted in Brazil. Establishing a groundbreaking regulatory framework for water use and conservation in the nation was influenced by internationally recognized concepts like water economics and public engagement. The internal inconsistencies of the ongoing institutional reforms have, however, generally prevented the possibility to address both old and new management issues, notwithstanding changes in policies and regulations (Loris, 2009).

The Water Act of 2002, which became effective by Legal Notice No. 31, was created to solve water-related issues service delivery and access. The Act aims to facilitate the streamlined and unified administration of sewage, water, and resource services. In order to more effectively improve service delivery, it was necessary to provide access to portable water and sanitation services and ring fence water and sewerage income for reinvestment in the infrastructure. The water sector must now concentrate on new prospects and overcome a number of obstacles in order to execute the new devolved framework effectively. This brief examines relevant concerns and options for national leadership and local government (Sambu & Tarhule, 2013). Technically, the Water Act 2002 was abolished by the Water Act 2016. In order to improve services and align service delivery with the COK 2010 principles, the Act proposes a variety of changes in the water sector.

Athi Water Works Development Agency is one of the nine (9) Water Works Development Agencies (WWDA) formed by the Ministry of Water, Sanitation & Irrigation (AWWDA). The Water Act of 2016 formed it, as stated in Legal Notice No. 28 of April 26, 2019. The focus of the investigation will be the Athi Water Works Development Agency. Nairobi, Kiambu, and Muranga counties' water and sewage infrastructure is created, managed, and maintained by the Agency, which together span 5,800.4Km² and have an estimated population of 8,012,390.

Currently, the Agency's capacity for producing bulk water is 664,337 m³/day, and its capacity for treating wastewater is 210,500 m³/day.

The Agency works closely with Water Service Providers to manage the development of water and sanitation infrastructure and to maintain it. The Water & Sewerage Companies (often referred to as WSPs) in her area of jurisdiction have been designated by the AWWDA to provide the service.

Statement of the Problem

Recently, academic interest in devolution as a method of governance has increased (Steeves J, 2015). However, evaluating how well the devolved system is working in the field is a continuous effort. Notwithstanding evident intuitive connections, there is no comparable data on how and why decentralization matters for institutional performance in specific sectors. By examining the connections between decentralization and water institutional transformation throughout the counties, we aim to close the evidence gap. The success of Kenya's decentralised water systems should be clarified by this study.

Studies on water service providers in underdeveloped nations (Zekri & Easter, 2007) revealed a negative association between planned outcomes, actual outcomes, and the amount of resources used. Data Envelopment Analysis based on water reforms was utilized to evaluate the success of WSPs (Sambu & Tarhule, 2013) in order to meet the MDGs by 2015. 44 WSPs were chosen and evaluated on a variety of efficiency metrics, including technical efficiency and scale efficiency, based on the availability and trustworthiness of the data. All WSPs were found to be running at far below capacity and were unlikely to achieve the MDGs. In the context of devolution, this study investigated the causes of the discrepancy between the resources available and the sustainability outcomes predicted.

Objectives of the Study

- i. To assess the impact of devolution on financing of water supply
- ii. To examine how devolution affects the effectiveness of technical efficiency of water supply
- iii. To determine the efficacy of expansion strategies on water coverage on the background of devolution

Literature Review

Theoretical Foundation of the Study

A formal, peer-reviewed theoretical model (or models) that describe the problem that motivates any research serves as a theoretical foundation. The resource dependence theory and game theory are both used in this work.

Game Theory

John von Neumann and Oskar Morgenstern provided the game theory that is familiar to economists, social scientists, and biologists with its first general mathematical description (1944). Since Ransmeier's groundbreaking application of Game Theory (GT) to the Tennessee Valley Authority investment project in 1942, the use of GT to address problems with water resource management has steadily increased (Heaney, 1979). However, Kenya has not used this approach in relation to water service companies. The study of decision-making scenarios involving several decision-makers is known as "game theory" and each decision-maker's is affected by the decisions of the other decision-makers. The mathematical social sciences have mostly explored game theory as a modeling paradigm, the fact that a controller can be thought of as a decision-making entity, however, means that there is a major relationship to control systems. Thus, when there are multiple cooperating controllers, game theory can be used. Even when none of the agents may have intended the effects in question, game theory examines how interdependent actions made by economic actors result in outcomes that are related to their preferences (or utilities).

Given the scarcity of water, game theory presupposes conflict between competing consumers and uses. Conflicts occur frequently between industries that use water at various times of the year, such as irrigation and hydropower (Dinar & Hogarth, 2015). Water is frequently referred to as a common pool resource (CPR), which encourages users to act strategically. The second and most pertinent supposition is that different kinds of externalities can affect water resources. The CPR nature of water is connected to one sort of externality, the congestion externality. Another sort of water externality is linked to pollution and is more obvious when upstream-downstream relationships are dominant. Third, water is more strongly linked to uncertainty and information asymmetry, which has an impact on how the agents involved behave strategically.

Water services are just one example of how decentralization frequently alters institutional structures in a nation. Decentralization has been used by several nations to improve service delivery outcomes, especially in the area of water access (Resnick, 2014). Theoretically, decentralization can facilitate service delivery by enhancing administrative effectiveness, localizing decision-making authority, better resourcing for implementation, and better awareness

of local requirements and conditions (Conyers, 2007). Empirical research reveal contradictory effects in actual use (Combos et al., 2017; Channa, 2016; Ahmad, et al., 2005). Decentralization doesn't always lead to better service delivery because the results depend on the following variables: (a) the project's specifics (its scope and form); (b) how these interact with more general variables like the country's political, social, and economic framework; and (c) the service being provided (Conyers, 2007; Boex & Simatupang, 2015).

Conflicts can arise when managing water resource systems. Stakeholder actions that may otherwise result in improvements and a win-win scenario occasionally make things worse for everyone. Game theory can help to identify and comprehend the activities of the parties involved in water resource problems and can explain how the interactions of various parties that prioritize their personal goals over the goals of the system lead to the evolution of the system (Madani, 2010). According to game theory, both sides must share a shared reform agenda and be able to convey it in order to reach an agreement.

Conflicts over devolution and water reforms extend beyond the issue of cost- or benefit-sharing, which is where many water experts have concentrated their attention. Conflicts often develop in the design, administration, and management of water reforms on a social and political level (Zekri & Easter, 2007). The project must be physically, environmentally, financially, and economically feasible in addition to being socially and politically feasible before assessing, running, or planning water reforms. This presents a challenge to those responsible for developing and implementing policies who often gauge performance in terms of the economy, finances, and health.

This theory has drawn criticism since game theory outcomes frequently diverge from those suggested by optimization techniques, which depend on everyone acting in the best interests of the system as a whole (Dinar, 2004). Additionally, game theory has not been fully incorporated into the analysis of broad systems for water resources. Due to a lack of comprehension of this theory's fundamental ideas, the water resources community may continue to be unsure of its value. Therefore, the effectiveness of devolution on water reforms will be evaluated using this theory in the Athi Water Development Works Agency.

Resource Dependence Theory

The External Control of Organizations: A Resource Dependence Perspective was written by Jeffrey Pfeffer and Gerald R. Salancik (1978). It covered the origins of power and dependence as well as how organizations might utilize this power to control other organizations that are dependent on them. According to the resource dependence theory, inter-organizational relationships can be used to increase control over resource supply and secure the resources that

are required. The management of resource dependencies effectively and power interactions are the main areas of concern for scholars (Ebers and Oliver, 1998).

An investigation into how the external resources of organizations influence their behaviour led to the development of the Resource Dependence Theory (RDT). In other words, the idea looks at how businesses interact with the goods they require to function. Raw materials, funding, and staff are just a few examples of the various types of resources. Obtaining these outside resources is a crucial component of any company's strategic and tactical management. Other businesses become reliant on a corporation when it holds all of the stock in a certain external resource. A symbiotic relationship is so created. Uncertainty, vulnerability, and the possibility of external checks being placed on the organization are all effects of too much dependence. Governments and other organizations have the power to impose external checks, and doing so can have a big impact on how a firm conducts its daily operations, such recruiting and funding. The Resource Dependence Theory (RDT) is founded on the idea that resources are essential to an organization's performance and that power is built on having access to and control over these resources. (Hillman et al., 2009)

This theory proposes a study of water service providers focused on the five approaches that minimize environmental dependences: mergers/vertical convergence, partnerships as well as other trans linkages, boards of directors, collective participation, and executive succession (Hillman et al., 2009). Although confined by their setting, managers can take action to lessen environmental uncertainty and reliance because the theory acknowledges the impact of external influences on organizational behaviour. The idea of power, which is the command over essential resources, is central to these behaviours.

The theory's underlying premise is that corporations are constrained by a web of interdependencies with other organizations rather than being independent, which is crucial for comprehending intercorporate relations and society (Drees & Heugens, 2013). Even if these actions are obviously never totally successful and give rise to new patterns of reliance and interdependence, organizations must take action to manage external interdependencies. This interdependence results in a situation where survival and ongoing success are uncertain since there is uncertainty surrounding the behavior of people who the organizations are interdependent with. The hypothesis has drawn criticism because these inter- and intra-organizational power-producing patterns have been shown to have some influence on organizational behavior.

Devolution of Water Services

Devolution is a multifaceted and difficult process. Global initiatives to decentralize have taken on a variety of shapes, from the highly decentralized nature of some federal states, like Germany and several Spanish regions, to the more constrained authority of regions in France or, until

recently, Mexico (Pranab, 2002). As a result, conceptualizing devolution is not at all straightforward. Typically, it entails legitimacy, decentralization of power and resources, and decentralization of resources. The study suggests looking for a lowest common denominator that would describe the devolutionary process as being composed of three distinct elements.

The actors involved in the devolution process have competing interests, and their shared claims to legitimacy make the process difficult. Most crucially, devolution's component aspects tend to conflict between subnational and national governments' interests. Despite the fact that national governments would; *ceteris paribus*, prefer to transfer duties and authority to their regional or state governments with the least amount of resources possible, subnational governments would prefer the opposite situation. The balance between these extremes will depend on the relative strength, or, in political terms, legitimacy, of the two tiers of authority (Warner & Pratt, 2005). Care must be used when examining the evidence, though, as a simple list-based approach may disregard how the components interact.

Devolution has also become commonplace outside of Europe, particularly in big, diverse states. Regional autonomy has occasionally been given. This is the situation with Indonesia, which implemented autonomy rules in 1999 to reverse decades of highly centralized administration and to allay separatist sentiments (Aspinall & Berger, 2001). In China, there has been widespread fiscal decentralization, giving regional and local governments significant power and encouraging policy innovation at the regional level, despite the fact that political devolution has not officially taken place and the Chinese Communist party still maintains a tight grip on political developments. The article suggests contrasting one sort of devolution with others in different jurisdictions.

Other times, regional autonomy levels that already existed have been increased. The cases from Latin American nations have been the most notable. In Mexico, the 1982 economic collapse and the ensuing political unrest resulted in significant changes to politics based on territory. Although Mexico's constitution has been officially federal since at least the 1910 revolution, advancements in political systems of representation, accountability, flexibility, and democracy during the past 20 years have led to a fundamental overhaul of territorial politics in favor of greater federalism.

For a very long time, Africa and other emerging nations have experienced inefficient public service delivery due to excessively centralized government bureaucracies (Mwabu G & Kibua T, 2008). To increase the effectiveness of providing services to the public, numerous initiatives have been made in Kenya to cut down on redundant levels of government. This paper suggests additional research into specific industries to determine the effects of devolution.

(Ngigi S & Nekesa B, 2019) claim that Kenya's inhabitants sought access to public services near to where they lived, which led to the creation of a decentralized system of government.

According to Articles 174 and 175 of the Constitution, the objectives of devolution include defending the rights and interests of minorities, fostering democracy and accountability in the exercise of power, fostering national unity by recognizing diversity, enhancing people's self-governance, empowering communities to run their own affairs, and ensuring equitable resource distribution. The report suggests creating a framework and a supportive atmosphere for all parties involved in the implementation of devolution.

Devolution has not, however, been implemented in an atmosphere that has been free of difficulties for the previous five years. Corruption, a lack of public participation, gender inequality, inadequate funding allocations and delayed disbursements of funds by the National Treasury to Counties, disagreements between the National Government and County Government over funding for County functions, poor or nonexistent consultation on issues affecting County Governments, and lack of funding for County functions are some of the issues. The report advised that it was crucial to assess how these difficulties have impacted Kenya's devolution implementation (Steeves J, 2015).

Sustainability

Despite much effort being put into creating quantitative measures of sustainable development, there are still ongoing definitional uncertainties around sustainability. The literature places a strong emphasis on systems where nature or the environment serves as a source of goods and services for the practical support of humanity. Contrarily, a sizable amount of literature places more emphasis on nature's fundamental traits and biodiversity than on how useful it is. According to recent views, three very different categories—people, economy, and society—should be cultivated in order to achieve sustainability (Parris & Kates, 2003). The economy, with its productive sectors supplying both work and desired consumption and wealth, was the subject of the majority of early writing. The economy is portrayed in this literature as providing both financial resources for environmental upkeep and restoration as well as incentives and means for investment. In recent years, the emphasis has switched to people, with a focus on human development, longer life expectancies, education, equity, and opportunity (Bossel, 1999). There are calls for society to advance with a focus on the safety and well-being of states, localities, and entities in addition to the social capital of interpersonal connections and ties to the local community. In actuality, organizations and groups frequently accept the several, contradictory goals that must be met in order to maintain and advance development.

Water Supply

International freshwater law is still in its infancy, and current legal frameworks like the 1997 UN Convention only cover a small number of pertinent concerns (Cherunya et al., 2015). However, the international framework for freshwater law and policy is becoming more crucial in guiding

national law reforms, particularly in emerging nations. Water law reforms in most developing nations have greatly benefited from resolutions that are not legally enforceable, such as the Dublin Statement on Water and Sustainable Development (1992).

Beyond a simple analysis of the current water law and regulations in India, a thorough examination of the environmental, social, economic, and human rights aspects of water as a natural resource has been conducted (Cullet, 2009). To provide a philosophical framework for the reforms that all countries will need to accomplish in the short- to medium-term, an examination of freshwater regulation in a broader context either applauds or condemns ongoing water sector improvements. Only a portion of Kenya's water reform initiative through water service providers involves decentralization. National water planning, changing the perception of water from a social good to an economic one, and implementing innovative methods are some of the other reforms (Sambu & Tarhule, 2013). Water access is a major problem for developing nations. Kenya is one of those nations where a lack of water resources and inadequate water infrastructure threaten the population's health and standard of living and impede its economic and social progress.

Devolution and Sustainability

One of the most common buzzwords in the world's policy agenda, including in devolved areas, is sustainability. Almost all governments have vowed to promote sustainable development by fusing social coherence, environmental quality, and economic welfare. As a result, there is a strong political push for a thorough evaluation of changes in social, environmental, and economic conditions (Bossel, 1999). Identification of operational indicators that give manageable units of information on economic, environmental, and social situations is necessary for tracking progress toward sustainability (Barraque, 2003). Country-specific data on economic, environmental, and social circumstances are among the three pillars of sustainable development, are evaluated using sustainability indices for countries, which offer a one-dimensional statistic.

Devolution and Water Service Providers

Devolution and water reforms were discussed in *Decentralization, Devolution and Development: Reflections on the Water Reforms Process in Zimbabwe* (Derman et al., 2000). They concluded that managing natural resources, especially water, necessitates comprehending the intricate intersections of international, national, and local management regimes located within a background of intense economic, political, and institutional change. Water is a naturally fluctuating resource that is impacted by both short-term and long-term climate changes. Changes in the management of water are especially important because water is necessary for all life. Zimbabwe chose to decentralize water management in response to both internal and international circumstances, and it began a wide-ranging water reform effort that included changes to its legal

system, institutions, economy, and political system. The study recommended greater research to determine how money allocated for reforms in the water sector may be used more efficiently.

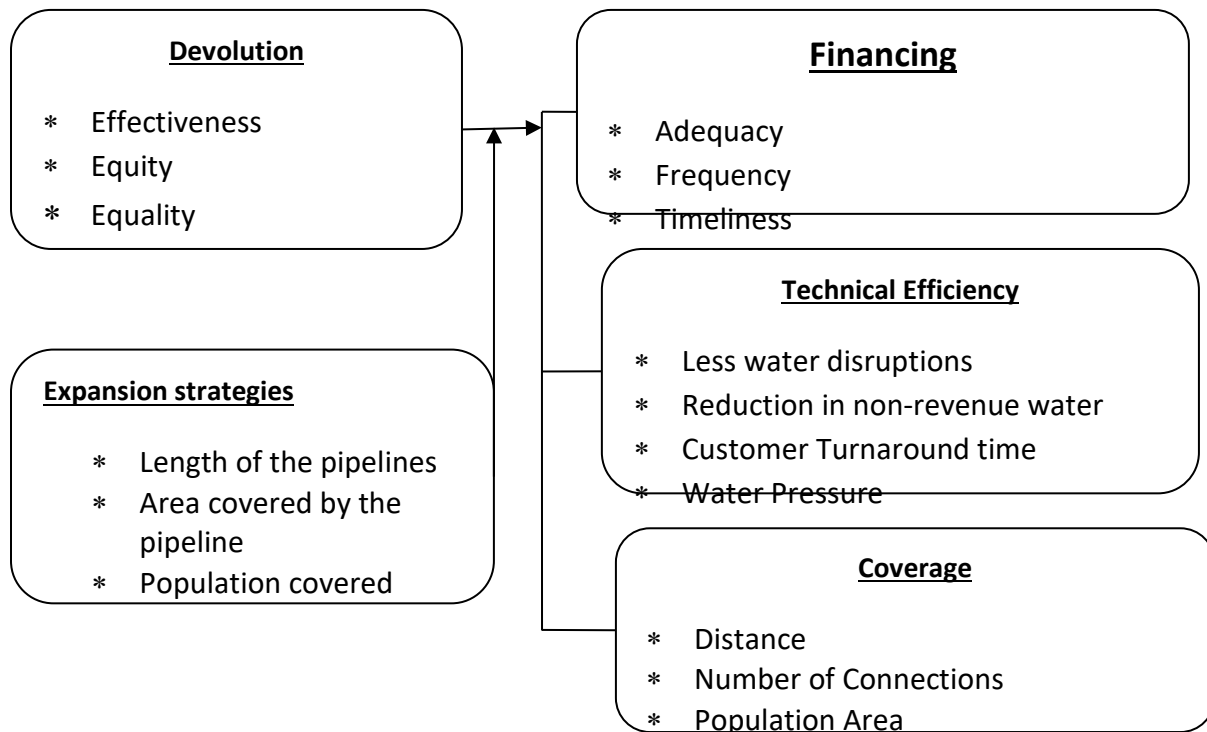
A critical analysis of some of the gendered features of emerging water governance regimes focused in particular on those relating to the privatization, marketization, and devolution of water resources management (Harris, 2009). It was determined that neoliberalization discourses and trends are having an impact on how resources are used, accessed, managed, and under what circumstances. Reconsideration of the main themes of the scholarly discussion has also been stimulated by contributions from nature-society viewpoints. The analysis put gender and neoliberalism front and center. It urges additional research on devolution and water service providers.

Sustainability and Water Service Providers

There have been many reactions to the need to increase the water industry's sustainability. Efforts have been made to improve corporate planning by including regional and global environmental challenges, in addition to efforts made to identify and address some of the most glaring environmental issues in the area, as demonstrated by blatantly obvious adverse ecological reactions (Lundie et al., 2004).

This has encouraged the creation of novel ways to communicate the problems and the rate of work being made to solve them (Schulz et al., 2012). the creation of guidelines for corporate environmental reporting, such as those set forth by the Global Reporting Initiative (GRI), a multi-stakeholder process and independent body operated by the United Nations Environment Program, has been one of the major advancements in the water industry's sustainability information over the past ten years.

Conceptual Framework



Research Methodology

Both cross-sectional surveys and descriptive research designs were used in the study. With the use of the descriptive study design, the researcher will have the chance to gather information from all departments within the Athi Water Works Development Agency and empirically examine the relationships between the variables. Given the scope of the inquiry, the nature of the statistics, and the methodology of the analysis to be conducted, this research design is also thought to be the most suitable (Cooper & Schindler, 1998). A cross-sectional survey design was used for the study, which entails gathering information on the phenomenon being studied at the time of the study and allowing conclusions to be made. A huge number of response units are captured in a single point in time by the cross-sectional survey methodology (Zhang & Creswell, 2013). The Athi Water Works Development Agency consists of thirteen water service providers (WSP's) in Nairobi, Kiambu and Muranga Counties. This is the location of the study. The Athi Water Works Development Agency is made up of thirteen water service providers (WSPs) in the counties of Nairobi, Kiambu, and Muranga. This demography is justified since it is representative of urban, peri-urban, and rural locations and may be used to generalize behavior of all Kenyan water providers. Given that the estimated time and cost are within the researcher's budget, this is deemed suitable (Kothari, 2004). The researcher focused on all the thirteen (13) WSP and hence, the study employed a census-style approach. The collected data was analyzed descriptively and inferentially. The descriptive analysis involves mean, standard deviation and

frequency. Inferential analysis in this study involves correlation analysis, model summary and chi-square. After analysis, data was presented using text, tables, graphics, and prose.

Results and Findings

The researcher dispatched 13 questionnaires to selected respondents. However, 11 questionnaires were dully filled and returned to the researcher. This gave a response rate of 84.6% which is deemed sufficient for the study. Mugenda and Mugenda (2008) contend that a response rate of 50% is acceptable for analysis; response rate of over half is good while over 70% is very good.

On Institution Profile, Runda, Muranga, Nairobi and Thika has the highest water coverage as presented by 100%, 96%, 85% and 85% respectively. Water coverage stands at 53% in areas covered by Water Service Providers in Kenya (World Bank, 2019). Service providers are responsible for establishing, maintaining, and upgrading the water supply system, which typically involves for: collection, treatment, distribution, quality control, sewage, and reuse of water.

Also, the findings established that Gatamathi, Nairobi and Kahuti has the highest level of non-revenue water as indicated by 56%, 51% and 50% respectively. The level of Non-Revenue Water affects the water utilities and their customers. The challenges to achieving the Kenyan dream includes a high level of Non-Revenue Water (NRW) which is estimated at an average of 45% of the water coverage. Water utilities in Kenya continue to struggle with high Non-Revenue Water (NRW) which results in staggering losses in revenue. On employee current job designation, majority of the respondents were managing director of the water sector as indicated by 45.4%. Those working as technical manager and engineer are presented by 18.2% each. Also, the findings revealed that 9.1% of the respondents work as GIS analyst which tie to those working as Non-revenue water coordinator. The performance of a projects is invariably related to a manager's ability to recognize and use informal procedures, relationships, agreements, and communication channels. On the work experience duration of the employees, a majority of respondents had worked in water sector for more than 16 years as presented by 54.5%. However, those who had worked between 11 and 15 years constituted 9.1%. In addition, 18.2% of the respondents had worked between 6 and 10 years which is a like to those worked for less than 5 years.

Devolution on financing of water supply

The objective one of the study was to assess the impact of devolution on financing of water supply. The responses from the participants were presented in Table 1

Table 1 Descriptive Statistics for implementation of performance contracts

Statements	Mean	Std Dev	CoV
The water services are devolved	3.75	0.56	0.12
The devolution of water services has been successful	3.69	0.59	0.13
The devolved resources are adequate	2.32	1.63	0.16
The water resources are released to counties in a timely manner	2.53	1.45	0.15
The county government is supportive to water service provider	3.66	0.55	0.12
Average scores	3.19	0.96	0.14

The results presented in Table 1 established that majority of the respondents noted that water services are devolved as supported by a mean of 3.75 with standard deviation of 0.56. Respondents also noted that devolution of water services has been successful as indicated by a mean of 3.69 with standard deviation of 0.59. The responsibility for providing water has been devolved to democratically elected county governments, who now have to balance meeting the demands of their constituents with upholding the constitutional mandate to gradually offer water services to everyone. In 2013, Kenya's new Constitution (Constitution of Kenya 2010), which made access to water supply and sanitation services a fundamental right and transferred significant water and sanitation responsibilities to the county level, went into force. The County Government Act of 2012 and the Urban Areas and Cities Act of 2011 are two important pieces of legislation that have laid the groundwork for significant reforms.

The participants also noted that devolved resources are inadequate as represented by a mean of 2.32 and standard deviation of 1.63. Furthermore, water resources are not released to counties in a timely manner as supported by a mean of 2.53 and standard deviation of 1.45. Water resources are a critical factor in developing sustainable water and sanitation services. In the framework of devolution, it will be necessary to assess both new and existing money flows for investment and come to agreements between the federal government and county governments about how these investments are reformed. To sustain and increase the level of financing in the sector and achieve the established targets, it is crucial that devolution of capital funding arrangements be carefully handled (Rutto, 2017).

Furthermore, the respondents noted that county governments are supportive to water service provider as presented by a mean of 3.66 and standard deviation of 0.55. Under The Water Act, 2016 WSPs are now the responsibility of county governments who have the mandate to provide water services. The WSPs are responsible for provision of water services within the area

specified in their licenses and development of county assets. This is supported by Nancy (2018) who established County governments still need assistance to improve their capacity to properly supervise the delivery of water services. To increase county governments' capacity to strengthen their regulatory authority, significant investments are required. Good governance cannot be replaced; thus it is crucial to get it correctly.

Effectiveness of Technical Efficiency

The objective two of the study was to explore how change in technical efficiency affect water supply after devolution. The responses were tabulated in Table 2

Table 2 Effectiveness of technical efficiency

Statements	Mean	Std Dev	CoV
There is significantly reduction of non-revenue water	3.89	0.67	0.13
There is improvement of customer satisfaction index	3.95	0.69	0.12
Quality of water has gone up	3.78	0.61	0.11
There is reduction in water interruptions	3.86	0.73	0.16
Average scores	3.87	0.68	0.13

From the findings in Table 2, participants noted that there is significantly reduction of non-revenue water as indicated by a mean of 3.89 and standard deviation of 0.67. reducing NRW is important to overall efficiency and financial sustainability, since it provides additional revenues and reduces water loss. NRW management often offers superior cost-effectiveness compared to supply augmentation.

The respondents also noted that there is improvement of customer satisfaction index as presented by a mean of 3.95 and standard deviation of 0.69. Customer satisfaction plays a significant role in maintaining balance between customers' demand and utility performance Customers' satisfaction with tap water quality is not necessarily linked with the water quality itself (Ochoo et al., 2017) as it pertains to compliance with the parameters set by regulators.

From the findings, the respondents noted that quality of water has gone up as supported by a mean of 3.78 and standard deviation of 0.61. Through technological aspects water regulators and utilities can assess the performance of their peers from both a production and quality of service point of view. The utilization of new infrastructure and utilities increases water efficiency and consumer conservation programs hence increasing the sustainability of water supply. According

to Romano (2011) improving water efficiency reduces operating costs (e.g., pumping and treatment) and reduces the need to develop new supplies and expand our water infrastructure.

The respondents also noted that use of technical efficiency reduces water interruptions as indicated by a mean of 3.86 and standard deviation of 0.73. Water use efficiency refers to technical and economic approaches to reducing the quantity of water used to achieve a given task. This is supported by a study by Buafua (2015) who established that regulating water utility operations via performance contracts leads to higher technical efficiency.

Also, the research sought to determine the association between effectiveness of technical efficiency and water supply sustainability through chi-square. The findings were presented in Table 3.

Table 3: Chi-square test of technical efficiency and sustainability of water supply

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	21.45 ^a	3	.036
Continuity Correction ^b	3.64	1	.027
Likelihood Ratio	1.27	2	.05
Fisher's Exact Test			
Linear-by-Linear Association	.16	1	.218
N of Valid Cases	11		

The findings displayed in Table 4.5 show that chi-square test statistics (χ^2) is 21.45, with p-value of 0.036 which is less than 0.05 indicating that there is a significant relationship between the technical efficiency and sustainability of water supply. The use of technology in water supply reduces water loss thus enhancing sustainability of water supply.

Financing

The study sought to determine how financing influence the devolution of water service providers. The findings are displayed in Table 4.

Table 4: Descriptive Statistics for Financing

Statements	Mean	Std Dev	CoV
There is adequate allocation of resources for projects	2.42	1.41	0.11
Projects are completed within projected time and cost.	2.49	1.53	0.14
Reported incidences of misappropriation of funds have reduced	3.47	0.59	0.15
System checks and controls are effective	3.56	0.57	0.12
Average scores	2.99	1.03	0.13

From the findings in Table 4, respondents noted that there is inadequate allocation of resources for projects as indicated by a mean of 2.42 and standard deviation of 1.41. The results of this study were consistent with those of Owino (2018), who concluded that citizens' access to water was hampered by the national and county governments' insufficient financing of investments in the water and sanitation sector. The results corroborated a study by Zakayo (2017) that found that the distribution of resources, notably money, had a significant impact on the execution of water projects and, consequently, on people's access to clean water. The results concurred with those of Orina (2014), who found that a lack of resources was the main obstacle to ensuring increased access to clean water.

The respondents noted that projects are not completed within projected time and cost as indicated by a mean of 2.49 and standard deviation of 1.53. Preferably, all the resources required for the construction work should be available if the water project is expected to be completed within a short period. The water project should have financial and human resource projections associated with its completion so that it becomes successful. The findings are supported by findings of Mweke (2016) who highlighted that the major challenge was lack of funds to support the program implementation.

Also, the respondents noted that incidences of misappropriation of funds have reduced as indicated by a mean of 3.47 and standard deviation of 0.59. The use of technological in water metering and piping, digital documentations have reduced funds misuse. Resource allocation by county government had the largest effect on access to water in the county. Zakayo (2017) noted that increased inconsistencies in releasing funds, most of the water projects were not completed on time and implementation activities were punctuated with occasional stoppages of project works hence delayed benefits to intended citizens particularly access to clean water.

Furthermore, the respondents noted that system checks and controls are effective as indicated by a mean of 3.56 and standard deviation of 0.57. Effectiveness of water governance relates to the contribution of governance to defining clear. Improved efficiency promotes service delivery and financial stability.

The study also aimed in determining the association between financing and water supply sustainability. A chi-square was used to show the association and findings presented in Table 5.

Table 5: Chi-square test of financing and sustainability of water supply

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	23.34 ^a	3	.043
Continuity Correction ^b	4.78	1	.023
Likelihood Ratio	1.43	2	.03
Fisher's Exact Test			
Linear-by-Linear Association	.19	1	.224
N of Valid Cases	11		

The findings displayed in Table 4.7 show that chi-square test statistics (χ^2) is 23.34, with p-value of 0.043 which is less than 0.05 indicating that there is a significant relationship between the financing and sustainability of water supply. As per Gedi (2019) the water service providers are financial unsustainable and are faced with weak management structures, processes and systems and poor systems of revenue collection.

Water coverage

The study also sought to determine how water coverage influence the sustainability of water supply. The findings were presented in Table 6

Table 6: Descriptive Statistics for Water Coverage

Statements	Mean	Std Dev	CoV
The number of water connections has gone up proportionately to financing	3.71	0.69	0.14
The population under water coverage has gone up after devolution	3.53	0.64	0.15
The area under water coverage has gone up after devolution	3.79	0.72	0.12
Average scores	3.68	0.68	0.14

From the findings presented in Table 6, respondents noted that the number of water connections has gone up proportionately to financing as indicated by a mean of 3.71 and standard deviation of 0.69. The applicability of key financing concepts and conventional formulas that have been widely used in the water supply has enhanced water connections. According to World Bank (2020) water providers that collect only 70% of their allotted tariffs, or have non-revenue water rates of 40%, are simply not financially viable or creditworthy.

Also, the respondents noted that population under water coverage has gone up after devolution as indicated by a mean of 3.53 and standard deviation of 0.64. The water and sanitation crisis in the devolved system remains serious. It is aggravated by unprecedented urban population growth, fueled by rural-urban migration due to factors like drought, conflict and rural poverty. According to UNICEF (2019) proportion of population using clean water and improved sanitation facility is generally low just 45% in 2019 and an increase of only 5 percentage points from 2010.

Lastly, the respondents noted that the area under water coverage has gone up after devolution as indicated by a mean of 3.79 and standard deviation of 0.72. Changes in the management of water are especially important because water is necessary for all life. In order to more effectively improve service delivery, it was necessary to provide access to portable water and sanitation services and ring fence water and sewerage income for reinvestment in the infrastructure. The water sector must now concentrate on new prospects and overcome a number of obstacles in order to execute the new devolved framework effectively (Sambu & Tarhule, 2013).

Also, the study sought to determine the association between the water coverage and sustainability of water supply. The findings are presented in Table 7

Table 7: Chi-square test of water coverage and sustainability of water supply

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	26.15 ^a	3	.013
Continuity Correction ^b	5.63	1	.040
Likelihood Ratio	1.51	2	.05
Fisher's Exact Test			
Linear-by-Linear Association	.23	1	.415
N of Valid Cases	11		

The findings presented in Table 7 show that chi-square test statistics (χ^2) is 26.15, with p-value of 0.013 which is less than 0.05 indicating that there is a significant relationship between the water coverage and sustainability of water supply. This shows that the existence of water coverage affects the water supply sustainability.

Inferential Statistics

The researcher conducted regression analysis to establish the effectiveness of devolution on sustainability of water supply in Kenya. The findings of Model Summary and correlation analysis are as shown in subsequent sections.

Model Summary

The findings of coefficient of correlation R and coefficient of adjusted determination R^2 is as shown in Table 8

Table 8: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.926	0.857	0.846	0.103

a. Predictors: (Constant), Technical efficiency, financing, water coverage

b. Dependent Variable: Sustainability of water supply

The results established that coefficient of correlation R was 0.926 an indication of strong correlation with the variables. The findings also established that coefficient of adjusted R^2 was 0.857 which translates to 85.7%. This explains that 85.7% of sustainability of water supply can be explained the following variables; technical efficiency, financing, water coverage. The residual of 14.3% can be explained by other factors beyond the scope of the current study.

Correlation Analysis

To decide the nature, strength and bearing of connection between concentrate on factors, relationship investigation was directed. The coefficients range between 0 and 1 and they were interpreted as weak if they were below 0.3, moderated if they were 0.3-0.5 and any value above 0.5 was considered strong. Table 9 presents the correlation analysis results.

Table 9 Correlation Analysis

		Water supply sustainability	Technical efficiency	Financing	Water coverage
Water supply sustainability	Pearson Correlation	1.0000			
	Sig. (2-tailed)				
Technical efficiency	Pearson Correlation	0.3120*	1.0000		
	Sig. (2-tailed)	0.0043			
Financing	Pearson Correlation	0.2900*	0.143	1.0000	
	Sig. (2-tailed)	0.014	0.296		
Water coverage	Pearson Correlation	0.2314*	.0.214	0.1590	1.0000
	Sig. (2-tailed)	0.0144	0.156	0.254	

As shown in Table 4.12, it is observed that technical efficiency and water supply sustainability in Kenya were moderately and negatively correlated ($r=-0.212$). The p-value (0.0043) was below 0.05 which is an indication that the relationship was significant. The findings also show that financing and water supply sustainability in Kenya have weak, negative relationship ($r=-0.2900$). The p-value (0.0140) suggests significance of the relationship since it was less than selected significance level of 0.05. Finally, water coverage has a moderately strong negative relationship with water supply sustainability in Kenya ($r=-0.2314$). The p-value (0.0144) was below 0.05 which is an indication that the relationship was significant.

Conclusion and Recommendations

Conclusion

From the findings, the study concluded that for water services to be delivered in an efficient and effective, it is imperative that water service providers (WSPs) are commercially viable. This in turn requires the realization of economies of scale, which can only be achieved where utilities reach a certain minimum size. Devolution provides an opportunity to increase water service delivery and increase water coverage to meet universal water access and Sustainable Development Goal No. 6. It is evident that Kenyan water policy has evolved over time to

accommodate decentralization though much more needs to be done in terms of revision and enforcement of existent legislation. The study concluded that financial resources are key drivers in water supply sustainability. It is important that devolution of capital funding arrangements is well managed to maintain and grow the level of funding in the sector to meet the aspiration for water to all Kenyans. Failure to address financial issues is a main obstacle to achieving water supply and sanitation goals in many countries. There is usually a significant underfunding even for basic costs of operating and repairing facilities in operation

Recommendation

From the findings, the following recommendations are deduced;

The County Governments and other water service agencies should support the organizational capacity of the devolved water suppliers as it contributes positively to service delivery.

The study recommends that various stakeholders, especially those in the county government, become familiar with the legislative and policy framework guiding water management in the county for efficiency in implementation after discovering that the national government establishes policy frameworks for the county to adopt. As it turned out, despite their leadership roles, some county leaders are not familiar with the county's policy structure. The study also suggests that county stakeholders create policies that take particular water needs for growth into account.

To improve the effectiveness of service delivery, the study also suggests that the roles and responsibilities of the various stakeholders in the county's water sector be properly clarified. Water institutions should also have the staff members they need to perform the various tasks that hinder productivity.

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