

Challenges hampering water infrastructure development in Africa

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Abstract: The article discusses the difficulties that water infrastructure faces in African context. The need to create effective and efficient water infrastructure is highlighted, as well as the connection between water and the objectives of sustainable development goal (SDG) 6. The information included in the article was gathered through a literature review and is based on qualitative desktop analysis. The internet, Acts, government documents, journal articles, annual reports, and journal papers are a few examples of secondary sources of information. The findings point out several difficulties with the development of water infrastructure, including migration, climate change, population growth, urbanization, deteriorated infrastructure, water scarcity, poverty, a lack of financial and human resources, as well as poor maintenance of water infrastructure. The economic, political, technological, infrastructural, environmental, ecological, and institutional aspects that negatively affect infrastructure development are presented in the article. The article suggests using public-private partnerships (PPPs) as an alternate solution to the problem. The article therefore aim is to examine the challenges in water infrastructure as well as the role that PPPs play in it. PPPs' role in the development of water infrastructure is described, with an emphasis on best practices that Africa might follow to improve water infrastructure. Therefore, the study looks at how PPPs were used in a few countries that had water-related problems and evaluates how PPP implementation enhanced the water infrastructure built in the selected countries. These evaluations offer best practices and insights that African nations with weak water infrastructure might use. The article therefore aims to examine the benefits and difficulties of developing water infrastructure as well as the role that PPPs play in it. The article aims to create awareness regarding the challenges hampering the realization of SDG 6 in Africa, and hence contributes to the disciplines of public administration/management /governance and water studies.

Keywords: Africa, qualitative research, sustainable development goal 6, water, water infrastructure.

Introduction

The UN published an assessment report in 2015 about the progress in attaining the Millennium Development Goals (MDGs). Regarding Goal No. 7 Schedule 2, the report noted that although 1 billion people had access to improved sanitation, the world failed to meet the MDG target (United Nations [UN], 2015a, p.29; Mutandwa, 2023, p. 128). Through the review of UN-Water 2015 documents, Mutandwa (2023: 128) cites that, experience of the MDGs illustrates that a thematically broader framework for water sanitation and supply is called for in the development agenda post-2015. After further review of UN Water 2015 documents, Mutandwa (2023, p.128) added that, in 2014, UN-Water passed a recommendation that dedicated SDG6 to water. The Goal comprises five target areas, namely water resources, water governance, waste management, water quality and water-related disasters. Clean and adequate water is a scarce resource in the world, especially in Africa growingly so in urban areas. Current urban water infrastructures are under severe pressure and are impacted by various factors causing challenges. These challenges range from, inter alia: rural to urban migration, climate change, natural disasters, limited financial resources, institutional capacities, skills, and human resources. As a result, governments across the African continent struggle to meet Constitutional mandates of providing safe and adequate water as well as sanitation within their areas of jurisdiction.

The purpose of this article to discuss the relevance of Public-Private Partnerships (PPPs) for improved water infrastructure development in Africa. The information commences by outlining some of the challenges related to water infrastructure in Africa. Further, the study proceeds to unpack why PPPs are an alternate to improve urban water infrastructure in Africa. The study continues to discuss research methodology employed to gather information, and a discussion on the main findings of the study is detailed. The author concluded by providing recommendations on how African countries can better improve water infrastructure through the implementation of PPPs in in nation states hence improve water service delivery.

The article proposes the use of PPPs as an alternative solution to improve the water infrastructure and the rationale behind the suggestion is that Africa is facing paradigm shifts in its governance structures, discussed in this section.

Note that “most African countries have experienced (some still do) the crisis of political turmoil, intolerance, and harsh dictatorship; others have a military regime with highly centralised government processes. To name a few, Sudan, Zimbabwe, Libya, Ethiopia, and Uganda are in dire straits, resulting in a marked degree of social disintegration and economic stress throughout the continent. In this scenario of authoritarian ideology, public administration merely administers commandments and decrees. There is a need for African governments to transform these dictatorships” (Vyas-Doorgapersad, 2011, p.238), and opt for social, economic, political, and technological transformation for improved service delivery. This transformation requires public service and public sector reforms, bringing a paradigm shift from administration to management approaches, hence emerged a new concept called New Public Management (NPM). This aspect is detailed in this section that explains that the “NPM concept is linked to the neo-liberal and conservative economic movements” (Mascarenhas, 1993, p.319; Pollitt, 1993, p.1; Mutandwa & Vyas-Doorgapersad, 2023, p. 58), whereby “the 1990s witnessed the establishment of PPPs as a crucial component of public policy worldwide” (Osborne, 2000, p.1; Mutandwa & Vyas-Doorgapersad, 2023, p. 58) as an outcome of NPM. According to Mitchell-Weaver and Manning (1991, p.63; Mutandwa & Vyas-Doorgapersad, 2023, p.58), NPM has transformed the attention of public management from public service to service delivery. Vyas-Doorgapersad (2011, p.238) argues that the PPP concept is a reformed public sector transformation that breaks away from the autocratic, conservative, and repressive paradigm of public management that ensured top-down hierarchies. In the African context, the NPM approach was initiated in numerous African countries such as Mauritius, Ghana, Senegal, Ethiopia, and Uganda as they embarked on comprehensive reforms ostensibly to improve the quality of life of their citizens and for the government to create new machinery that establishes effective and efficient systems of management, cites Vyas-Doorgapersad (2011, p.239; Mutandwa & Vyas-Doorgapersad, 2023, p. 58).

The scope of NPM was to reduce expenditure in the public sector, delegate responsibilities to the private sector and foster voluntary engagement of the private sector in the provision of public services and goods (Mitchell-Weaver & Manning, 1991, p.63; Mutandwa, 2023, p.58). Privatisation is now an emerging trend, and this implies the transfer of operational responsibility for and control of state functions as well as service provision to suitable private voluntary organisations or sector enterprises. Looking at a broader perspective, privatisation encompasses a wide range of policies encouraging private sector involvement in the provision of public service and the elimination or modification of the public enterprises’ monopoly, according to Hope as cited in Vyas-Doorgapersad (2011, p.239; Mutandwa, 2023, p.58). NPM came about because of the belief that the traditional bureaucracies were inherently inefficient in meeting public demands. The idea was to reconfigure the state along more cost-efficient and effective lines. According to Hood (1991, p.8; Mutandwa, 2023, p.58), protagonists of NPM advocated for the opening of the public sector to greater private influence. Osborne (2000, p.1; Mutandwa, 2023, p.58) argues that PPP is an outcome of NPM.

These paradigm shifts also raised awareness regarding the use of various economic theories, such as political economic theory, principal-agent theory, transaction cost theory, governance theory, and public choice theory, that may be assessed in the context of PPP utilization for effective water service delivery. PPP contracts are said to involve the principal-agent theory, governance theory, public choice theory, and transaction cost theory (Mutandwa, 2023). The principle-agent theory highlights problems with agencies, including how the principal is susceptible to agents' opportunistic and self-serving behaviors, including moral hazard selection bias. Because of this, the principal-agent theory's management applications put a heavy emphasis on establishing appropriate control mechanisms to govern how uncertainty and risk are allocated between principal and agent (Mutandwa, 2023). The transaction cost theory refers to the costs of PPP agreements. The application of economics to political science or the application of market ideas to public administration are both highlighted by the public choice theory. The idea is useful in analyzing the economics of political institutions (Mutandwa, 2023). As a result, the theoretical framework that was used for this study was built on the many theoretical contributions to the literature that were stated above. However, the idea of transaction costs served as the study's main theory (Mutandwa, 2023).

Materials and Methods

The study employed a qualitative approach to gather information. Qualitative research, according to Bricki (2007, p.1; Nhlapo, 2020, p.22), is characterised by its aims, which relate to understanding some aspect of social life, and its methods which (in general) generate words, rather than numbers, as data for analysis. This approach is considered as ‘seeks to develop an in-depth understanding [and] views social phenomena holistically’, cites Nyikadzino & Vyas-Doorgapersad (2020, p.33; Vyas-Doorgapersad, 2021, p.1). The research design is exploratory in nature. an exploratory research design focusses on the generation of new ideas from and regarding an equally new subject matter (Kumar, 2014, p.31; Soga, 2022, p.:34). This design is generally used to investigate an old subject matter from a new perspective and/or old or common phenomena that despite being well-investigated remain less understandable to society (Babbie, 2016, p.92; Soga, 2022, p.34). Exploratory research designs, thus, resonate or align well with interpretive paradigmatic views that do not stress the need for over-structured, systematic research aimed at attaining measurable output (Kumar 2014:31; Soga 2022:34). Instead, the design stresses flexible research approaches and processes that facilitate a more natural knowledge flow that is accommodative of new and independent perspectives and/or which supports the sharing of individual experiences (Babbie, 2016, p.92; Soga, 2022, p.34). With this understanding, it can be asserted that exploratory research design is best associated with qualitative research methods (Kumar, 2014, p.31; Soga, 2022, p.34). As such, exploratory research focusses on the ‘what’ pertaining to a given phenomenon (Creswell, 2009, p.115; Soga, 2022, p.34). The study utilizes the exploratory research design to find answers to the ‘what’ questions, such as: what are the challenges in water infrastructure development in Africa? And What are the advantages of using PPPs to improve water infrastructure in African context? The information was compiled through literature review, that, according to Machi and McEvoy (2012, p.4; Mutenga, 2021, p.40), “is a written document that presents a logically argued case founded on a comprehensive understanding of the current state of knowledge about a topic of study. Boote and Beile (2005, p.3; Mutenga, 2021, p.40) lament that “a substantive, thorough, sophisticated literature review is a precondition for doing substantive, thorough, sophisticated research. A researcher cannot perform significant research without first understanding the literature in the field”. The information is secondary and considered for desktop analysis, and includes books, journal articles, internet sources, Acts, official documents, news articles related to water infrastructure and PPPs.

Results and Discussion

From the review of literature compiled under this section, it is apparent that shortages of water in urban areas are the main reasons for the outbreaks of waterborne diseases such as typhoid, cholera and diarrhoea. The water sector reforms that were implemented were unable to arrest the continuous deterioration of urban water infrastructure. The limited water delivery in the urban areas is often erratic and of questionable quality largely due to a lack of water purification chemicals, electricity blackouts, unavailability of spare parts for pumps and other equipment as well as leakages through the seriously dilapidated network for water supply, thus compounding the problem (Mutandwa & Vyas-Doorgapersad, 2023, p.60). This section explores challenges regarding water infrastructure and suggests the use of PPPs to improve the situation.

Challenges related to water infrastructure in Africa

In developing countries, managing water resources is challenging due to various issues, ranging from political, economic, environmental, and social (Van Rooijen, Kayaga & Smout, 2011, p.29; Mutandwa, 2023, p.122). In developing countries, urban water disposal and supply are characterised by low revenue for the delivered services, high water transmission, distribution losses and poor maintenance of systems (linked to low revenue) and inadequate water infrastructure and sewerage networks (Cohen, 2006, p.3; Mutandwa, 2023, p.122). A trajectory of sanitation and water supply development may be considered instructive in the light of typical and structural urban water issues that developing countries face. Rapid urbanisation continues to pose challenges to cities’ sustainability in developing countries (UN Habitat, 2008, p.5; Mutandwa, 2023, p.122). These and other several factors are considered to be the root causes of the challenges related to urban water infrastructure in Africa, discussed in this section.

High population is one of the social variables that contributes to problems with urban water infrastructure in Africa. With an estimated 1.1 billion people, the continent has the highest population growth. Migration to urban regions is rapidly rising because of urbanization. This is because people want to have access to necessities like water and toilets. Because of this, there is a lot of pressure on the government to make sure that the infrastructure is in place to satisfy the requirements of the populace (Chitonge, 2020, p.202). Urban regions that are overpopulated have more slums, have limited access to water and power, and have worse sanitation and solid waste management. To address these concerns, African countries are compelled to raise their national yearly public spending on urban water infrastructure.

This makes it challenging for the government to create the required urban water infrastructure to fulfill demand with its limited financial resources (Chitonge, 2020, p.202).

For the first time in history, more than half of the global population live in towns and cities and by 2050 the proportion is expected to rise to two-thirds. Even though water and sanitation access rates are generally higher in urban areas than rural areas, planning and infrastructure have been unable to keep pace in many regions. Today, 700 million urbanites live without improved sanitation, contributing to poor health conditions and heavy pollution loads in wastewater (UN Water, 2019, p.1). Rapid urbanization, together with other factors, has already surpassed the capacity of the city's infrastructure to handle the demand for water. Water demand is already under pressure, but it is made worse by economic expansion and the middle class' quickening rise and corresponding rise in requirements. Considering the changing climate and the paucity of freshwater, this is concerning. Bamako (Mali), Kampala (Uganda), Lagos (Nigeria), Lusaka (Zambia), and Ouagadougou (Burkina Faso) are among African cities named by OECD that are anticipated to be impacted by this development since they are in regions at high risk of water stress (Organisation of Economic Co-operation and Development (OECD), 2021). Also, to consider that "water security is already a major challenge for African countries and cities due to increased water demand tied to population growth, urbanisation and climate change impacts. Demographic trends are pushing water demand up with the African urban population projected to nearly double from more than 560 million in 2015 to 1.1 billion in 2050" (UN, 2015b; OECD, 2023). With "41% of the sub-Saharan African population currently living in cities, and a projected increase to 60% by 2050" (UN, 2015b; OECD, 2023), "urbanisation will generate specific challenges related to access to quality drinking water and sanitation services. Climate change is also exacerbating the pressure on water resources with two-thirds of African cities estimated at 'extreme risk' with regard to climate change impacts. The amount of gross domestic product (GDP) in African countries exposed to 'extreme risk' will grow from USD 895 billion in 2018 to USD 1 397 billion in 2023" (Verisk, 2018; OECD, 2023), "which represents 48% of the African continent GDP. For instance, in sub-Saharan Africa, the cumulative effect of the last decades indicates that floods and droughts alone are responsible for around 80% of disaster-related deaths and 70% of economic losses" (Fiott, 2010; OECD, 2023). It is important to consider that "damages to infrastructure, property and assets caused by tropical cyclones or flooding are among the more obvious impacts but droughts, crop failure and instability brought by climate change may also move millions of people towards cities through cross-border and rural migration" (Verisk, 2018; OECD, 2023).

Water accessibility is a factor in the problem as well. More than half of Africa's urban population must rely on a shared water supply, which is frequently a standpipe, a pump, and infrequently a well. However, in many Sub-Saharan Africa countries where household income levels are relatively low, effective water pricing plans could not be feasible. The ability to obtain funding and assistance from developed countries and international organizations, as well as participation in other district initiatives and governance methods, are essential and crucial motivators (De Santos, Adams, Neville, Wada, Sherbinin, Bernhardt & Adamo, 2018, p.22). In Sub-Saharan Africa, worries regarding the distribution and allocation of water resources, water pollution, inadequate institutions, poor management, and a dearth of political leaders to solve water shortages are also on the rise (Mulenga, 2017, p.57). In many nations across the world, the threat that water scarcity poses to water infrastructure, and their political and government stabilisation is becoming more widely acknowledged (Van der Bruggen, Borghgraef & Vinckier, 2010, p.1).

In Africa, politics is one of several variables that contribute to water shortage, including the development of water infrastructure. An increase in conflict over the availability of water and the construction of storage facilities will always result from the existence of various political factions. The main issue is that everyone involved may have different ideas about how to improve the quality of infrastructures, and these different ideas will cause tension as more people choose to use inexpensive materials when building water projects while others may be opposed to the idea because they have better thinking skills regarding the infrastructure's long-term viability (Blanke, 2006, p.77). Another type of political element is corruption; most African leaders are ineffective in decision-makings and use their positions of authority and resources to further their own financial interests rather than allocating them to the advantage of the populace. Due to the continent's lack of unity, the water issue and the growth of urban infrastructure will persist throughout Africa for a very long time. Other political crises result from land rights and disagreements over dams and reservoirs (Blanke, 2006, p.77).

According to the United Nations (2014, p.1) The majority of people in sub-Saharan Africa, which is the world's poorest and least developed area, make less than \$1 per day their primary source of income. Approximately two-thirds of its countries are among the lowest in the Human Development Index (HDI). Pahl-Wostl, Vörösmarty, Bhaduri, Bogardi, Rockström and Alcamo (2013, p.706) argue that deep and pervasive poverty in the African continent makes it difficult for many cities and urban areas to provide adequate water and sanitation services, enough water for economic activities, and to stop the deterioration of water quality, even though possibilities for dealing with outstanding water-

related problems exist. It was added by Yescombe (2007, p.12) that finances, which are crucial to the implementation of public service, are also included in the economic aspects. Low earnings, lack of assets, and underemployment or joblessness in rural areas are all related to the economic component. Lack of infrastructure, investment money to create and maintain water infrastructure, high levels of public debt, inefficient processes for allocating resources, insufficient managerial capacity, poor governance, and inadequate institutional frameworks are issues faced by rural communities. Additionally, even with investments, corruption and resource mismanagement remain a problem. Additionally, the OECD (2015, p.32) stated that the prevalence of unemployment, poverty, and financial inactivity make it difficult for governments in the area to collect enough domestic revenue to pay for the expensive maintenance and continual monitoring of currently operational water infrastructure and the provision of freshly constructed infrastructure and sanitation management systems.

Environmental challenges in urban centres are visible when ecosystems and humans are under threat from polluted water. Improper wastewater disposal creates health risks (Van Rooijen et al., 2011, p.38; Mutandwa, 2023, p.128). Wherever there is no piped sewerage system, waste management is facilitated through open drains constructed for stormwater drainage and this results in heavy pollution, for example, in Abidjan (Obrist, Cisse, Kone, Dongo, Granado & Tanner, 2006, p.319; Mutandwa, 2023, p.128) and Accra (Karikari, Asante & Biney, 2009, p.2; Mutandwa, 2023, p.128). The environmental challenges in urban centres are visible when ecosystems and humans are under threat from polluted water. Improper wastewater disposal creates health risks (Van Rooijen et al. 2011:38; Mutandwa 2023:128). Urban pollution causes environmental degradation and has an adverse effect on water quality. Issues concerning the environment must be addressed to prevent waterborne ecosystem degradation and health risks beyond city borders (Government of Zimbabwe, 2008, p.2; Mutandwa, 2023, p.128).

Another issue African governments will confront from one generation to the next is poor management and wasteful spending on infrastructure development throughout the continent. According to Khatri, Noblet & Cooper (2007, p. 11) water infrastructure systems in urban areas need to be better empowered, and good financial management is essential. For these systems to function effectively, all of the infrastructures that supply water must be protected, and safety measures must be put in place to guarantee that the water is fit for human consumption. Most water supply projects in Africa, which is known as a developing continent, were abandoned in 2015. Ethiopia was one of the nations that were poorly maintained due to a lack of financial resources and lower levels of management, and this unethical behavior by officials puts the quantity and quality of water supply at risk (Khatri et al., 2007, p. 14).

Use of PPPs to improve water infrastructure in Africa

For several years, public service has been blamed for poor service delivery (Mange'ra & Bichanga, 2013, p.1; Mutandwa, 2023, p.76). Also, Osborne and Plastrik (1997, p.4; Mutandwa, 2023, p.76) attribute poor service delivery to public servants' inefficiency, ineffectiveness, insensitivity and often hostility toward the people they are supposed to serve. Several countries have attempted to implement reforms to deliver services to citizens effectively and efficiently through crafting a Citizen Charter (Mange'ra & Bichanga, 2013, p.1; Mutandwa, 2023, p.76). A Citizen Charter describes the quality, nature and quantity that citizens ought to expect from public institutions. Citizen Charters were first articulated by the Conservative Government of John Major in the United Kingdom (UK) in 1991 as a national programme that aimed to improve the quality of public service. Similar programmes were initiated across the globe; these leaned on total quality management (TQM), which is a service quality paradigm (Mange'ra & Bichanga 2013:1; Mutandwa 2023:76). The Centre for Good Governance (2008; Mutandwa, 2023, p.76) mentions that several countries have service charters, for example, Malaysia (Client Charter 1993), Belgium (Public Service Users' Charter 1992), Australia (Service Charter 19997), Canada (Service Standards Initiative 1995), India (Citizen's Charter 1997) and France (Service Charter 1992). Rapid technological, political, and social changes forced several governments to accept fundamental administrative changes to embrace development. Traditional bureaucracy irritated citizens and NPM shifted the paradigm of management to good governance (Osborne & Gaebler, 1992, p.231; Mutandwa, 2023, p.76). Vyas-Doorgapersad and Aktan (2017, p.3 cited in Maile & Vyas-Doorgapersad, 2022, p.80; Mutandwa, 202, p.:76) posit that good governance can also be regarded as a novel paradigm in the area of public management. The neo-liberal paradigm shift, pure marketplace ideology and private sector efficiency approach failed to sustain the values espoused by new public management, creating an environment in which the central issues of fairness, equity and market failure are re-emerging as government after government realises that the voices of the ordinary citizens — the majority — cannot be ignored in favour of the powerful, the few particularistic interest groups and elites (Ikeanyibe, Ez' Ori & Okoye, 2017, p.3 cited in Vyas-Doorgapersad & Aktan, 2017, p.3; Maile & Vyas-Doorgapersad, 2022, p.80; Mutandwa, 2023, p.76).

The critical force driving the emergence of NPM was the belief that monopolistic and large bureaucracies are inherently inefficient (Andrews & Van de Wale, 2012, p.3; Mutandwa, 2023, p.76). The implementation of a panoply of practices such as contracting out and later, PPPs, would reconfigure the state along more cost-effective and efficient lines (Andrews & Van de Wale, 2012, p.3; Mutandwa, 2023, p.76). This arrangement of PPPs as part of NPM in Africa's water sector dates back to 1959, with the implementation of the Côte d'Ivoire urban water afterimage—a successful operation that continues to provide water to over 7 million people today. In the many decades since the first PPP was launched, creativity, technology, and political realities have changed the face as well as the function of PPPs. PPPs have proved to be an important tool in improving utility performance, leveraging finance, and stimulating a much-needed sense of competition and accountability in an otherwise monopolistic water and sanitation sector (World Bank, 2014). Both development and disappointment have been very beneficial. As a result, there is presently a wide range of knowledge regarding PPPs insight derived through firsthand understanding. It is possible for others to benefit from this experience as well by consolidating this data and making it more widely accessible, teaching people about productive water PPPs in Africa in the future (World Bank, 2014).

Public-private partnerships (PPPs) may develop pledges to make investments in the African governments in order to rebuild the outdated infrastructure. PPPs will be implemented, improving infrastructure from rural to urban regions while also generating jobs to eliminate poverty through water infrastructure projects. The biggest problems in Africa, it has been concluded, are poverty levels and access to drinkable water (Amos, Pearse, Ristow and Ristow, 2016, p.109). This statement is substantiated by Vyas-Doorgapersad (2023, p.457) suggesting that the supply of water services is the foundation of any nation's economy. By increased employment in industries, a healthy economy lowers poverty and improves the availability of products and services. Several African governments, however, are unable to finance investments in urban water infrastructure due to financial constraints. PPPs could be the answer since private partners can provide the resources and technical know-how needed to design, build, and/or renovate urban water infrastructure. PPPs will increase employment, encourage industry, and strengthen the entire economic cycle by providing access to clean water. Vyas-Doorgapersad (2023, p.457) further stated that using PPPs in urban water infrastructure might be one of several strategies to address the problems with this infrastructure.

PPPs are implemented globally to improve service delivery in various sectors. One global and one regional case study are assessed in this section exploring the benefits of PPPs in water infrastructure development and lessons Africa can learn from these assessments.

International case-study includes the Xining municipality that is situated in China. According to Neng, House and Xun (2019, p. 642; Mguli, 2022) the Xining municipality (in China) faces various challenges with regards to urban water infrastructure. The challenges are summarised as: rapidly growing population (Neng et al. 2019:642; Mguli 2022); the daily discharge of wastewater in the urban area was as high as 200,000 m³, and the technology used in the Wastewater treatment plants (WWTPs) could no longer meet the new environmental standards”(Neng et al, 2019:642; Mguli 2022); inadequate water that is not suitable for the consumption of humans hereby it can be said that his worsens the challenge of freshwater scarcity (Ma, Sun, Fu, Hall, Ni, He, Zhao, Du, Pei and Cheng, 2022, p.2; Mguli, 2022); there is an uneven distribution of water which exacerbates problems of inequality within the region. The Xining municipality is said to be faced with the challenge of extreme water pressures (Lee, 2010, p.1926). To improve the situation, the municipality pursued a concession Contract in the year 2007. This concession was a contract that was to run for 30 years as it included two main projects, The first project was a transfer-operates transfer project that aimed to cover already existing assets, the second was a build-operate-transfer (BOT) project which can be deemed as an extension of the first project. These projects actively aimed to ensure That wastewater was treated (Neng et al., 2019, p.643; Mguli, 2022).

Regional case-study includes Uganda that is in Africa. 90% of Uganda's population lives in rural and small-town areas, where water shortages are a regular occurrence. 60% of the population in these places, lacks access to clean water, and infant mortality and water-borne illnesses are pervasive (International Finance Corporation (IFC), 2010, p.1; Nqwala, 2022). Several problems, including a lack of access to financing for capital investments and the extension of piped water services, insufficient capability at all levels, and other factors contribute to Uganda's water sector's difficulties (World Bank, 2021). One of the top priorities for the Ugandan government is to increase access to and use of facilities for safe water and sanitation (Globalwaters, 2020; Nqwala, 2022).). The administration chose to decentralize the delivery of water supplies to accomplish this goal. Since 2001, the government has formed management agreements with private operators in more than 70 small towns and implemented PPPs in peri-urban areas (IFC, 2010; Nqwala, 2022).)

It has been observed that PPPs have a significant impact on the water supply sector in countries where they have been long established because they can cover more than 16 million people annually. If such measures are taken into consideration and are put into practice, the continent of Africa will greatly benefit from this effect (Rifkin, 2011, p. 22). Several investigations of PPP in urban area water resources have indicated that high-efficiency advantages have been achieved by the private sector involvement in public sector water delivery. For further details, refer to a report entitled *Private Sector Participation in Water and Sanitation Infrastructure*, released by the OECD Directorate for Financial and Enterprise Affairs, Investment Division (2007). According to the African Development Bank (AfDB) Report (2020, p.1; Mutandwa, 2023, p.132), five countries in Africa, Ghana, South Africa, Egypt, Nigeria, and Morocco, accounted for more than half of all successful PPP business from 2008 to 2018. Many other African countries have multiple PPPs in the pipeline, for example, Botswana has 8 and Burkina Faso has 20. This successful use of PPPs is further confirmed by the United Nations Children's Fund (UNICEF, 2021, p.49), stating that PPP has been found to reduce construction time and costs in countries like Benin, Burkina Faso, Mali, Mauritania, Mozambique, Niger, Rwanda, Senegal, and Uganda, where about one-third of minor piped water schemes are managed by private companies. In contrast to government-managed water supply projects, which frequently go over or under budget and fall behind schedule, PPP has been found to reduce these issues. It can be considered that this PPP arrangement is constantly increasing in Africa, and it posts a hope that water infrastructure development may get benefited using PPPs bringing their project management skills, technical expertise, financial support, human resources, technological competencies, hence a mutual benefit to both public and private sectors.

Further discussions and conclusions

African nations may increase investment appeal in three different ways. They must first make sure that they give prospective investors accurate information on proposed urban water infrastructure projects. For them to be able to fully analyze any risks and rewards, this includes giving them information on the performance of the assets. Second, they ought to utilize Development Finance Institutions to control and simplify their items. This should not restrict their creative or financial independence, but rather make their goods more user-friendly, which will encourage investment. Last but not least, they must make sure that their policies will create a climate that will make investments in urban water infrastructure very lucrative. (Lauridsen, 2017).

How to control and keep track of performance in these partnerships is a major problem that keeps coming up. To effectively benefit from PPPs, this process entails setting up the supporting institutions, practices, and processes. Explore issues with corruption, insufficient stakeholder consultation, lack of public involvement in PPP decision-making, etc. through case studies of PPPs; (c) talk about ways to make PPPs more accountable; (d) put together multiple versions of the Guidebook on Promoting Good Governance in PPPs and organize significant global discussions to debate and come to an agreement on these principles (United Nations Economic Commission for Europe, 2008).

All partners, the agreement of opposition parties, and stakeholders must support sustainable development via the creation and execution of policy measures for PPPs to be successful. The greatest level of assistance is required, for example, to make sure that public officials or other personnel do not hinder development out of concern for their employment. The success of national sector programs depends heavily on this support, which involves a strong political commitment from the government to advance water supply and sanitation, sustained consistently over a long period of time (Tsitsifli & Kanakoudis, 2008). To provide direction and confidence to all parties, especially private operators operating in the industry, the government should establish straightforward legislation and regulatory frameworks. This will allow them to develop their own strategies and plans and will protect their financial interests and property rights. It is crucial to encourage the transfer of operational and legislative responsibility over water supply services from the national government to communities and their local governments to raise quality and standards of service and accountability (Tsitsifli & Kanakoudis, 2008).

African governments require resources, such as talent management in the field of fourth industrial revolution (4IR) to handle technological aspects, finances to continuously improve and upgrade infrastructure, technical competence to monitor the phases and stages of water management, physical resources in terms of availability of equipment to fix infrastructure challenges, institutional resources to manage the water governance, to state a few. However, due to inadequate competence and skills, PPPs are required to collaborate with governments for improved water infrastructure development. PPPs may bring appropriate solutions to the infrastructure challenges. The arrangement requires governments and PPPs to sign a contract and have a clear understanding of roles and responsibilities shared for mutual benefit. The conventional view of governance is transforming, and governments are not solely responsible for service delivery. Globally countries are considering and implementing arrangements of bringing PPPs to share the

governance responsibilities and success stories have proven that this arrangement is beneficial for improved service delivery.

African countries have local commodities, potential resources, and domestic possessions to attract the investment from the private contractors and potential of development is a selling point for infrastructure investment. A contract between governments and private investors detailing the delegation of tasks, equity, processes to implement projects, etc. can avoid possible conflicts between the parties. The outcome is linked to the improved water service delivery to communities and understanding regarding tasks, responsibilities, shared equity, and mutual beneficial goals can assist governments and private investors to realise the set goals.

African governments need to budget for water infrastructure development projects, prioritise this need in the budget votes, and involve legislators and bureaucrats to formulate and implement appropriate water policies accommodating PPPs in the processes. Relevant stakeholders need to conduct workshops preparing water sector personnel to understand the varied roles shared under PPP arrangements, prepare a cost-benefit balance sheet exploring all possible risks and opportunities that may be encountered under the said arrangements, explore local economic development resources to be used for attracting investments, and have a short-medium-long term project plans prepared with forecast scenarios to handle unexpected disasters proactively.

Experts in the field of water study, engineers, and construction sectors, need to be part of the water governance and management projects. The expertise is required to conduct feasibility studies, environmental studies, needs analysis studies to prepare a detailed analytical project plan. Experts in the fields of human resources and finances also required to share their knowledge regarding linking projects to financial forecast and preparing a team of project managers. Private investors can also be allowed to bring their own experts to bring additional and advanced knowledge and expertise and this arrangement needs to be part of the contract to avoid any future consequences and conflict.

To avoid corrupt practices, African governments need to implement monitoring and evaluation practices and abide to the good governance principles. This includes periodic reporting processes, disclosure of personal interest in water infrastructure projects, submitting balance sheets to the relevant Boards, keeping records of all costs and expenses, submitting tax annually, awarding of tenders is done through procurement processes, stakeholders are involved in decision-making, principles of accountability and transparency are adhered to, annual reports are released to community members, budget sessions must be open to the public, annual reports are submitted to legislatures and councils. These are some of the measures that may enhance the culture of ethical governance in water sector practices and processes.

However African countries are prone to political instabilities. Governments need to ensure that any negative situation or unexpected political circumstances must not affect the bureaucratic processes, and the goal of service delivery be given ultimate attention. This suggestion may be hypothetical and remain abstract, especially in those African countries that are still facing dictatorships, ethnic crises, economic shutdown, and civil wars, to state few. This applicable status of this suggestion will be assessed incoming years only.

PPP's role in improved water infrastructure is imperative. There are areas whereby communities do not have access to clean water, there are shortages of water, there are leakages in water pipes, and infrastructure has deteriorated. Stagnant water has caused mosquitoes to breed, and hence resulted in the spread of malaria. The other health-related challenges caused by lack of drainage systems are cholera and diarrhea. This situation does not require authentication as it is practically understandable that stagnant, unclean water may cause the spread of diseases. Through PPPs arrangements, countries are able to build dams to maintain the flow of water, and give access of fresh water to communities; have installed water pipes; upgraded the dams walls to avoid disasters; sealed and changed the leaked pipes, etc. This assistance is significant to maintain the standard and quality of water resource management and water infrastructure development.

It is suggested that African governments need to conduct an environmental study to determine the nature of infrastructure required in a country-specific context. This is to avoid building dams and reservoirs in disaster-ridden regions. PPPs can offer their technical, financial, and technological support to conduct the required study. However, the significance of public participation cannot be underestimated. The governments in different African countries need to ensure that need analysis form part of the water infrastructure development plan. The personnel involved in water management and governance require appropriate training to operate and manage the infrastructure demands. PPPs can also bring their consultative team to offer the required knowledge and understanding to train the personnel, hence developing competence on environmental technical, technological and project management aspects of water

infrastructure development. Governments need to offer monitoring and evaluation practices to ensure the PPPs involvement, structures, processes, and governance are abiding to the expected standards and requirements.

The interviews with relevant stakeholders in the Water Governing Bodies, Ministry of Water, Water Directorates, Local municipalities would have added more value to the study. The lack of opinions of expert personnel and authorities is considered as a limitation to the study. The future studies may consider interviews in selected African countries as part of a longitudinal comparative study, contributing the fields of public management, and water studies.

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