

The challenge of effective policy implementation in Nigerian urban water utilities

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ABSTRACT

The effectiveness of policy implementation is rapidly becoming a widely researched area in the water sector. Previously, most studies focused mainly on developing technical innovations for delivering sustainable water services and little attention was given to subject areas such as governance, policy implementation, and legislation. Now, water professionals and policy makers are beginning to recognise that efficient services occur when social, political, economic, environmental and technical issues are taken into consideration; hence, subject areas like policy implementation have started receiving attention as well. Thus, many nations such as the UK, Australia, and the USA are constantly aiming to establish best institutional practices for their water sector, while countries such as Nigeria are yet to establish effective policy implementation processes. This research examines the challenge of effective policy implementation in Nigerian urban water utilities. The research showed that policies and legislation developed were of commendable standards, but the implementation process was predominantly hindered by five factors. Hence, these factors will need to be managed actively if the Nigerian urban sector wishes to achieve the intended results from water legislation and policies.

Key words | autonomy, policy implementation, service delivery

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INTRODUCTION

The implementation of institutions designed to ensure sustainable urban development for nations with limited resources has been a complex issue for policy makers and practitioners in various sectors. In the water sector, for example, complexity occurs in policy implementation due to factors such as rapid urbanisation, economic issues, socio-political issues and environmental issues. Furthermore, policy implementation cuts across a plethora of stakeholders with conflicting interests that are difficult to coordinate and manage. Stakeholders in the water industry include a wide range of regulators, policy makers, consumers, water companies, international organizations, community groups, academia, water professionals and government agencies. Hence, nations interested in experiencing the benefits associated with effectively enacting legislation, policies and governance will need to establish

innovative initiatives that allow developed policies to meet their aims. In nations like the UK, the USA and Australia, a wide range of studies related to achieving effective policy implementation in the water supply sector have occurred. These studies mostly establish ways for governing stakeholder interactions (Karamouz *et al.* 2010; OECD 2016), ensuring policies are achieved, assessing and reforming policies (Seppälä 2002; Brouwer *et al.* 2013), defining roles of key players at different points of the process (Rogers 1996; Johnson & Handmer 2002) and developing capacity needed (Bos 2006). However, effective policy implementation is not always the case in countries such as Nigeria, for example. This paper will assess the challenge of effective policy implementation in state water authorities in Nigeria responsible for delivering water services.

The structure of this paper presents first a detailed examination of the Nigerian water context and its established national policies and then a review of the research method applied in conducting this study. The key findings resulting from the study and the implication of these findings on policy implementation are presented next. The last section draws conclusions and recommendations from the key findings of the study.

BACKGROUND OF NIGERIAN WATER CONTEXT

Nigeria is recognized by many as the 'giant of Africa', because it is the most populous nation in Africa and it is the largest in terms of geographical size. Furthermore, it is the richest country in the continent owing to its massive oil dominated economy (Foster & Pushak 2011; AFDB 2014; Ikein 2016). The benefits associated with its oil rich economy have not been seen in social, political, and environmental aspects of the nation. The poverty rate indicator, for instance, clearly shows that a 100 million out of 170 million Nigerians live on less than \$1 a day which is far below the poverty line (Adejuwon & Tijani 2012; Kanayo 2014). Sustainable development in sectors such as water and sanitation is not as progressive as it should be and the situation at hand is that a lot of Nigerians still lack access to safely managed water and sanitation services which is the newly Sustainable Development Goals (SDG) target. WHO/UNICEF (2017) states that 19% of the nation's population have access to safely managed drinking water services and 33% of its population have access to basic sanitation services. Nigeria as a nation is enriched with abundant water resources capable of meeting its current population demand for drinking water supply; its surface water resource potential is estimated to be around 267 billion m³ and its ground water resource potential amounts to 52 billion m³ (FRN 2004; FMWR 2016). Its annual rainfall varies between 250 mm in the northern region to 4,000 mm in the southern regions (Adeoti 2010; Akpabio 2012). Its inland water bodies consisting of lakes, rivers, ponds, stagnant pools and floodplains cover an area of about 149,919 km² (Adeoti 2007; Adetunde *et al.* 2011). Every year, the Nigerian Government is said to invest 550 million US dollars in the Nigeria water sector which is geared towards

meeting the SDG of improved water supply (World Bank 2011). The government has also had collaborations with non-governmental organisations (NGOs) and international agencies such as the World Bank, Japan International Cooperation Agency (JICA) and African Development Bank (AfDB) aimed at reforming state water authorities, water infrastructure, policies, governance and legislation. Despite the existing abundant water resources, financial investments and water sector reforms, a large gap still exists in providing sustainable water services that meet the entire urban population of Nigeria (Hima & Santibanez 2015). According to (Akpor & Muchie 2011; OECD 2015; Akhmouch & Correia 2016) effective policy design and implementation is a key factor for delivering sustainable water practices amongst other factors such as inadequate financial investments and gaps in infrastructure. Thus, it will be important to identify factors that impact the implementation of policies in the Nigerian urban water sector. Also, understanding the reality of the Nigerian context can be achieved by carrying out a detailed investigation on case cities that depict the diversity of Nigeria. Also, using the right methods suited to meet the research aim of assessing the challenge of effective policy implementation in Nigerian water utilities is paramount for carrying out an accurate study, thus, the rationale for selecting the methods used in conducting this study is outlined in the next section.

METHODS

The qualitative research method was employed to meet the overall aim of the study which is to establish the challenge of effective policy implementation on the service of state water authorities in Nigeria. Yin (2013) justifies the use of qualitative research methods for undertaking in-depth investigations in a rich context; the approach provided enough information and evidence that could be used to effectively analyze the policy implementation process in the Nigerian urban water sector. In addition, the qualitative approach acts as a tool that does not treat the external environment of variables as noise in comparison with quantitative methods in which it is assumed the environment under which experiments are conducted are controlled (Saunders

et al. 2012; Myers 2013). The first three sections of the paper were informed by a review of literature relating to the Nigerian water supply industry. The results sections of the paper was informed by interviews and focus groups conducted with employees from four different utilities in different geographical locations in 2016. The rationale for the selection of four utilities was for establishing maximum diversity that could adequately represent the complexity and unique attributes of the Nigerian water sector. A profile of the cases and their unique context are shown in Table 1.

The study covered four utilities to ensure that the attained results were reliable, valid and transferable to other Nigerian utilities. Consent was sought at an organisational level for the utilities. Next, 75 senior-level water professionals in the different utilities were invited to take part in the study through personal invitations. Only 61 respondents took part in the study while the remaining 14 respondents were unable to attend the interviews even after much follow up due to busy schedules and unforeseen circumstances. Interviews were recorded, transcribed and analysed to establish common themes across the four utilities. Participants' responses in the four utilities were assigned codes P (numbers 1, 2, 3 ...), A, K and L, respectively, to ensure anonymity based on the ethical requirements of the research. Furthermore, a review of policy objectives and strategies associated with the selected case utilities shown in Table 1 showed policy objectives related to water quality, quantity and sustainable operations cut across the four case utilities. The common policy objectives cutting across the four case utilities were analysed against the common themes resulting from the study to show the potential impact they will have on the state policies. The National Water Resources Policy 2016 is a recently developed instrument for guiding decision making in the Nigerian water sector and states are meant to develop their policy instruments in line with the national water policy (FMWR 2007, 2016). The situation on ground as at when this study was conducted is that even though this policy instrument is seen as a potential solution for delivering sustainable water services in Nigeria, its implementation has been greatly impacted because the Draft National Water Resources Bill of 2007 meant to support the passing of the national water policy has not been approved by the National Assembly. This has caused discrepancies in the level policy implementation in the various state and also caused the presence of

silos and incoherency in respective state policies as stated by Goldface-Irokalibe (2006), WorldBank (2011), Ajai (2012), Akpabio (2012), and Macheve *et al.* (2015).

RESULTS AND DISCUSSION

The following key factors emerged as the common themes impacting policy implementation and they include funding, autonomy, population growth and rapid urbanisation, infrastructure decay and inadequacy, illegal connections and vandalism.

Funding

A major area which was identified from most respondents in the interviews as a hindrance to effective policy implementation was the lack of funds. It was difficult to finance expansion projects, rehabilitation of existing infrastructure, and payment of staff salaries, production costs (treatment of water) and maintenance and operation costs all at the same time. These are issues which impact the implementation of state policy objectives of increasing service coverage and access to clean water. In addition, revenue generated were stated to be insufficient for utilities to break even. Water tariffs were set at rates that could not cover production costs, payment of salaries and maintenance cost.

There were consumers who were classified as defaulters when it came to paying bills because of their beliefs that water was a human right which should be free. Some would go through any means to get water even if it meant connecting illegally to the utilities' water supply. A respondent captured this issue in the statement below:

'We have the challenge of payment of bills, some people feel that it's their right, that water is a social service provided by government, but that is not the case with other countries where people pay for the services but in Nigeria here, people take it as their right and they will not pay' (Respondent K5).

This scenario does not show the achievement of state policies associated with sustainability since utilities depended on state government subsidies and interventions from international

Table 1 | Profiles of the four utilities covered in this study

Case utilities	City profile	Main state policy objectives	Policy instruments
Case 1	Largest city in Nigeria and regarded as the country's industrial nerve centre. A mega city affected by rapid migration	Mission statement – To provide safe drinking water in sufficient and regular quantity, maintain good quality service through revenue generation to sustain operations, meet customer expectations by planning sustainable growth and promote community health by good potable water	Lagos Stage Water Sector Law (LSWSL) 2004. The Lagos State Water Policy 2013 is still a draft and yet to be implemented
Case 2	One of Africa's most expensive cities and the capital city of Nigeria. Home for most Federal Government agencies, parastatals and presidency. Fourth largest city in Nigeria and is projected to be a megacity in 2050	Its vision statement is 'to be a world class utility provider offering excellent services and which is uncompromising in the quality of its product – 'Potable Water'. Mandate – To control, manage, install, maintain all water works and services vested or to be vested on the Board by the Minister; <ul style="list-style-type: none"> • To ensure the supply of potable water of adequate quantity and quality for the territory; • To harness all water resources of the territory for economic development; • To encourage the conduct of research for the purpose of carrying out its functions; • To submit the result of such research to the Minister for policy formulation relating to water supply and pollution control in the territory 	When this study was conducted the utility was a self-regulating agency and there was no established policy or law as the National Water Resources Bill 2007 had not yet been passed. It was not established by a law or does not have a policy guiding its decisions as it was it began operations based on the pronouncement of the former minister. However, the mandate of the utility is clearly outlined previously
Case 3	Nigeria's oil and refineries hub and is very critical to the nation's economy because oil and gas is the major source of the Nation's economy	Main water supply policy objective – Improve access in quality and quantity, to safe water supply and provide adequate sanitation and hygiene in an affordable and sustainable way for all the people of the state	Rivers State Water Policy 2012
Case 4	Is situated in the north-western part of Nigeria with a population of about 1.8 million, and a major hub for trade, transportation and textile	Vision statement – To be a foremost provider of sufficient potable water for domestic and commercial, safe for irrigation, industrial and sanitation purposes. Mission statement – To earn a reputation and confidence of Kaduna State residents and callers, through the provision and promotion of adequate water and allied sanitation services in a sustainable and affordable manner that guarantees sufficiency, quality and returns to stakeholders. Core values <ul style="list-style-type: none"> • Efficiency • Accountability • Sustainability 	Kaduna State Water Board Law 2004. Kaduna State Water Supply & Sanitation Law (2016) was in draft form and awaiting approval when this study was conducted. There is no developed policy instrument, however, the law states its state's policy is outlined in the previously identified mission and vision statement

Sources: Chambers & Ekanem (2010); LWC (2010); RSMWRRD (2012); Ile-de-France (2016); Kaduna State Government (2016); KDSG (2016); LWC (2016); World Bank (2017).

donor agencies due to low cost recovery. These issues are captured in a commentary given by a respondent:

'The law establishes a level of autonomy for generating income and spending and that's what we do, but most times we cannot generate enough to purchase chemicals, pay electricity bills, pay staff salaries. We are not a profit making organisation, we cannot break even so most times we have to depend on the government to give us subventions which do not come on time because our collection rate is bad' (Respondent K2).

Danilenko *et al.* (2010) assert that utilities in developing countries are challenged by limited financial resources, often stemming from low efficiency and subsidized tariffs which is similar to what the results showed from the study. Policy implementation can only be effective when a financial system that ensures resources are invested at the right time in the right way and in the right quantities is in existence. Hartvelt & Okun (1991) states the need for utilities to have the capacity to transform financial resources into worthwhile projects and ventures. Funding serves as a support tool for meeting micro level water policies like water treatment, increasing human capacity, data management, infrastructure provision and maintenance. A utility can only implement policies based on its capacity. Capacity here is described in terms of intellect and available resources (human, information, financial). Funding contributes immensely to the success of policy implementation and Morris (2017) asserts that policy makers need to find innovative ways of ensuring resources are effectively employed thus allowing service providers sustain their business, develop capacity and also increase their levels of efficiency and effectiveness. Implementing more engagement strategies with the public during the policy development process could also be a way of sensitising the populace about the need to place more value on water and educating them about the efforts and monies utilities invest for providing water services. It could also be a route for getting the support and collaboration of the public.

Autonomy

Another significant factor identified by interviewees was 'the level of powers utilities had in making key decisions

associated with employment of staff, setting of tariffs, access to revenue, determining projects to be developed and level of control over water resources'. This corroborate carried studies by (Macheve *et al.* 2015) which identified the issues of autonomy in Nigerian Water Utilities. Decision making was bureaucratic and usually outside the jurisdiction of water utilities as most of them were operated as departments under a ministry or state government; even with the existence of state laws as shown in Table 1, establishing three of these utilities as autonomous corporations. A respondent referred to this issue and argued that:

'Utilities shouldn't be run as a department of another organisation. The National Assembly needs to pass the law as quickly as possible to make the utility board independent. It's necessary for us as an organisation so we can address issues of staffing, issues of operation and issues of infrastructure independently. You have the power to do whatever you want to do and be able to do it well' (Respondent A1).

Although participatory investment by state government and fund mobilization helped in revenue generation, political interference also occurred, as sometimes investments were made to achieve political aims and campaigns. Even with the laws establishing case utilities 1, 3 and 4 as independent corporations, the research showed issues regarding making financial decisions freely were still evident. A respondent in a case utility confirmed this in his commentary:

'... for instance, government can decide to put in a new facility, maybe extension or expansion, because it is their money, and they want to achieve political aims. There are slight changes because we sometimes design our policy based on the law but government may see it as not proper and they can interfere at any time' (Respondent K9).

State water authorities need to be given an acceptable level of autonomy that allows them act within the necessary capacity (financial and operational and intellectual capacity) that allows them sustains their business of delivering water services. Key players involved in the implementation process can act accordingly when they

have the powers to take decisions regarding staff management, infrastructure management and financial expenditures, otherwise any efforts they put in will only bring futile results. Hartvelt & Okun 1991 and Danilenko *et al.* 2010 assert the need for autonomy and capacity building because it makes it easier for utilities to deliver water policies and plans. Autonomy is important because it will allow utilities move from developing tactical plans, business cases and project proposals to actually implementing them without having to go through long and tough bureaucratic processes. At the same time, parent organisations will also need to support utilities and monitor the performance of utilities without necessarily disrupting their capacity to function properly.

Population growth and rapid urbanisation

The results from the interviews showed that state water policies associated with delivering water in the right quantities were impacted negatively by population growth and rapid urbanisation. This corroborates the findings of (Oramah 2006) which classifies Nigeria as a nation with the largest human population in Africa where natural resources are rapidly degraded and consumed. A respondent outlined the issue of related to population growth as follows:

‘Our water infrastructure is not enough and population growth is putting pressure on water supply. You can’t control population growth, our state is a major urban city and people troop in everyday’ (Respondent A10).

There was a school of thought that felt that population growth was a way to enable them to extend their facilities. For example, a respondent stated that:

‘if people are migrating the population increase will help us extend our facilities’ (Respondent A15).

Most of the urban cities assessed were attractive in terms of industrialisation, commercial activities and prospect of better living standards and livelihood. Thus, settlements were stated to have sprung up uncontrollably compared to projected population growth rate. This created a large demand gap which could not be closely matched to their

capacity in increasing water services in terms of financial resources, human capability, infrastructure and information.

‘We have staff for the distribution department but we need more because the city is expanding and the two staff we are having are the ones managing the system now so we need more staff and we need more distribution mains.’

Water policies are designed to deliver sustainable water services to a nation’s population. PAI (2011) argues for actively implementing water policies that address population growth challenges. Thus, effective policy implementation can only occur when policies developed accurately consider population and urbanisation issues. Nigerian Water policy-makers and professionals may not be able to control population growth and rapid urbanisation, however, they need to ensure future population projections are as accurate and innovative as possible so policies developed can be relevant for longer periods of time.

Infrastructural decay and inadequacy

Interviewees across the four case utilities identified working under the constraints of old equipment built in the 1950s and maintaining such equipment was no longer sustainable.

‘The equipment are also old, they need rehabilitation, the pumps, those equipment, and the plants are old’ (Respondent K3).

Some of the states had enough infrastructure for one aspect of service provision, for example, in a utility, they had enough new infrastructure for production but aging and inadequate infrastructure for distribution. The result of this will mean they will have to operate below production capacity of the new plants to avoid wastage. Respondents also stated the issue of having to stay in offices that were in a deplorable state which were not conducive for working effectively. Respondents also identified the pressures they experienced in meeting the teeming demands of customers as piped infrastructure, water treatment plants were inadequate. This is why most of these utilities had embarked on a lot of new and large infrastructure projects to bridge the

demand gap. But most, if not all, of these projects have not been completed when due, thus delaying the potential increase of service delivery. This situation is clearly not in line with delivering objectives related to innovation, quality standards, being a modernized organisation and service coverage stated in state policies outlined in Table 1. The following interviewee's comments captured this issue:

'Yes, the infrastructures we have now are very old and their cost of maintenance if you compare their cost of maintenance to their efficiency, it does not tell well for efficiency for a good organisation but we have to do something pending; when we have the reform project up and running it is actually not advisable to continue with the current infrastructure but people still need water...' (Respondent AP6).

Policy implementation in water utilities can only be effective when utilities have the required infrastructure capacity that can meet the needs of its population. The water industry relies heavily on infrastructure for sustaining its business, thus utilities tend to invest in infrastructure (Kang & Lansley 2012). Water policy makers and professionals in Nigeria will therefore need to consider innovative ways of increasing their infrastructure capacity. They will also need to target infrastructure development specifically in meeting developed policies and population needs. The government, especially, will need to ensure that monies that go into infrastructure projects add value to the water sector.

Unaccounted for water resulting from illegal connections, vandalism

The challenge of illegal connections to piped networks was pertinent to all four utilities as respondents identified it as a major source of concern and one of the factors triggering non-revenue water, compromise of water quality, damage of piped networks and disruption of service. These were factors identified during site visits by monitoring teams and tasks force assigned to monitor the performance of water pipelines. The challenge of illegal connections corroborate with the studies of Kingdom *et al.* 2006 which state that non-revenue water due to illegal connections is an issue common to developing countries where inadequate service

delivery occurs. Informal vendors, car-wash operators, industrial companies and defaulting customers were classified as people that connected illegally to their pipelines causing disruption to their services.

These issues of informal service provision was cited by Respondent A9:

'Informal service providers: sometimes they could be a hindrance because they are not organised, it is not something that is structured, yet we should be able to control their activities but if they carry on providing water supply from sources that we do not approve, of course it could endanger people and then it will still boomerang on the organisation since we are supposed to provide potable water supply to the populace' (Respondent A9).

Thus, if these informal service providers failed in providing sustainable and potable water it was more like an indictment on them as an organisation responsible for water and also impacted the delivery of the national water quality standards associated with the policy objectives of the case utilities highlighted in Table 1. Some of these vendors even went as far as connecting illegally to pipelines and destroying pipelines.

'Mairuwas (meaning water vendors that sell water in containers loaded in movable carts) goes to the extent of breaking our pipe; they do all kind of things to make us experience pipe burst. You know for those people once there is a disruption in the supply of water, definitely they will have access to sell their water' (Respondent A15).

'And we have some sachet water producers now competing very seriously with us and some of them are of negative impact because they use our water without paying for it. Sometimes they lie about having their own borehole whereas they are actually using our water without paying' (Respondent L17).

In addition, because urbanization in Nigeria was not as planned as in developing countries or followed strictly to master plans of cities, there were cases where houses were constructed on piped water networks:

'I want to talk on informal settlement of slums and shanties. In places where the settlements are not planned, people can just go; probably they want to build they might start digging and some pipes might get broken in the process. It will affect the facilities that the board has put in place' (Respondent A6).

The implication of the issue of illegal connection and pipe vandalism is that water utilities will lose monies that were supposed to be put into their business to wastage. They will also lose monies that have been incurred during the production process. In addition, pipe vandalism and illegal connections disrupt the services of utilities and create scenarios where water produced becomes inadequate in quality and quantity, thereby impacting the delivery of increasing service delivery which is one of the policy objectives specified in Table 1 for the state water policies in the case utilities studied.

Water utilities in Nigeria will need to actively improve their existing mitigating strategies for dealing with the issues of illegal connections and infrastructure vandalism. Some utilities had developed monitoring teams and task forces, however, they were not as effective as they should be because of the issues of autonomy and having the full capacity to handle issues related to non-revenue water. Hamdy *et al.* (1998) states that the development of appropriate policies and legislation creates an enabling environment for water utilities to deliver sustainable services. The government will therefore need to establish a legal framework that takes these issues into account and will also need to give water utilities the required legal backing they need to control issues of illegal connections, vandalism and unaccounted water and thus implement developed policies appropriately.

CONCLUSION

This study gave a detailed assessment of the challenge of effective policy implementation in the Nigerian urban water sector. The first section gave a background of the Nigerian urban water sector and its policy implementation. The next section focused on how the qualitative research method was used to conduct the study, the results from

the interviews were analyzed in great detail and the following recommendations about ways in which policy implementation could be more effective were proposed. Water utilities in Nigeria will need to actively improve their existing mitigating strategies for dealing with the issues of illegal connection and vandalism.

The state governments will therefore need to establish an enabling environment that will give utilities the required capacity they need to control issues of illegal connections, vandalism and unaccounted water and thus implement developed policies appropriately without political interference. In addition, actively designing water policies that address and consider stakeholder interests in the urban water sector in Nigeria could be a way to improve policy implementation in Nigeria.

In addition, establishing stakeholder engagement strategies while developing water policies could be a way of forming collaborations with influential stakeholders in the water sector and receiving support from the public. This will allow the creation of relevant water policies that can provide water services, mitigate the interferences from stakeholders with negative impact and, at the same time, continuously exploit the benefits gotten from stakeholders with positive impact and receives public support.

Water policy makers and professionals in Nigeria will also need to develop innovative ways of increasing their infrastructure capacity by targeting infrastructure development in meeting developed policies and population needs. The government will especially also need to ensure that monies that go into infrastructure projects add value to the water sector. Finally, utilities will need to find innovative ways for ensuring their funds and resources are able to turn into worthwhile actions and ventures for effective policy implementation.

In conclusion, water authorities in Nigeria will need to improve their policy implementation process if they intend to harness the opportunities associated with sustainable service delivery. Thus various routes will need to be considered. This paper forms a part of a wider research by the authors which involves developing an asset management (AM) framework which could potentially help utilities manage some of the outlined factors which have slowed down the policy implementation process of the urban water sector in Nigeria. AM is seen as a potential route

because of its inherent characteristics of being multi-disciplinary, holistic, and applicable to all types of assets (human, financial, physical and information assets). AM can also be integrated with other management systems and processes such as risk management, stakeholder management, and project management, thus, the rationale for developing an AM framework is established.

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REFERENCES

- Adejuwon, K. D. & Tijani, A. A. 2012 Poverty reduction and the attainment of the Millennium Development Goals in Nigeria: problems and prospects. *International Journal of Research in Social Sciences* 2, 53–74.
- Adeoti, O. 2007 [Challenges to managing water resources along the hydrological boundaries in Nigeria](#). *Water Policy* 9, 105–118.
- Adeoti, O. 2010 [Development of river basin organizations in Nigeria](#). *Research Journal of Soil and Water Management* 1, 91–100.
- Adetunde, L., Glover, R. & Oguntola, G. 2011 Assessment of the ground water quality in Ogbomosho Township of Oyo State of Nigeria. *International Journal of Research and Reviews in Applied Sciences* 8, 115–121.
- AFDB 2014 Nigeria becomes largest economy in Africa with \$509.9 billion GDP. Available: <http://www.afdb.org/en/news-and-events/article/nigeria-becomes-largest-economy-in-africa-with-509-9-billion-gdp-12981/>.
- Ajai, O. 2012 Law, water and sustainable development: framework of Nigerian law. *Law, Environment and Development Journal* 8, 91–115.
- Akhmouch, A. & Correia, F. N. 2016 [The 12 OECD principles on water governance—when science meets policy](#). *Utilities Policy* 43, 14–20.
- Akpabio, E. M. 2012 Water supply and sanitation services sector in Nigeria: the policy trend and practice constraints. In: *ZEF Working Paper Series* (J. Von Braun, M. Denich, S. Gerke, A. K. Hornidge & C. Schetter, eds). ZEF, Bonn, Germany.
- Akpor, O. B. & Muchie, M. 2011 [Challenges in meeting the MDGs: the Nigerian drinking water supply and distribution sector](#). *Journal of Environmental Science and Technology* 4, 480–489.
- Bos, A. 2006 *Capacity Building in the Water and Sanitation Sector at Times of the MDGs. Discussion Paper Prepared for the Round Table Workshop Organised by WaterLinks and PSO*. UNESCO-IHE, p. 23.
- Brouwer, S., Rayner, T. & Huitema, D. 2013 [Mainstreaming climate policy: the case of climate adaptation and the implementation of EU water policy](#). *Environment and Planning C: Government and Policy* 31, 134–153.
- Chambers, C., Ekanem, N. G. 2010 Federal public services reform programme: federal capital territory water board structural assessment and capacity requirement. In: *PAWS Consultation Report* (Partners for Water and Sanitation, ed.). Nigeria.
- Danilenko, A., Dickson, E. & Jacobsen, M. 2010 *Climate Change and Urban Water Utilities: Challenges and Opportunities*. *Water Working Notes* [Online]. Available: https://www.ib-net.org/publications/Climate_Change_and_Uilities_4-21-10.pdf.
- FMWR 2007 National Water Resources Bill. Second Draft. Federal Ministry of Agriculture and Water Resources, Federal Republic of Nigeria.
- FMWR 2016 *National Water Resources Policy*. Federal Ministry of Agriculture and Water Resources, Nigeria.
- Foster, V. & Pushak, N. 2011 *Nigeria's Infrastructure: A Continental Perspective*. Africa Infrastructure Country Diagnostic, Washington, DC, USA.
- FRN 2004 *National Water Policy*, 1st edn. Federal Republic of Nigeria, Abuja, Nigeria.
- Goldface-Irokalibe, I. 2006 Water Management in Federal and Federal-Type Countries: Nigerian Perspectives. *Africa Portal – a project of the Africa initiative*.
- Hamdy, A., Abu-Zeid, M. & Lacirignola, C. 1998 [Institutional capacity building for water sector development](#). *Water International* 23, 126–133.
- Hartvelt, F. & Okun, D. A. 1991 [Capacity building for water resources management](#). *Water International* 16, 176–183.
- Hima, H. & Santibanez, C. 2015 *Against the Current: How to Shape an Enabling Environment for Sustainable Water Service Delivery in Nigeria*. World Bank, Washington, DC, USA. <https://openknowledge.worldbank.org/handle/10986/22776>. License: CC BY 3.0 IGO.
- Ikein, A. A. 2016 Nigeria oil & external exposure: the crude gains and crude pains of crude export dependence economy. *The Business & Management Review* 7, 109.
- Ile-De-France, A. 2016 *Water, Megacities and Global Change: Portraits of 15 Emblematic Cities of the World*. UNESCO/ARCEAU IdF, Paris, France.
- Johnson, C. & Handmer, J. 2002 [Water supply in England and Wales: whose responsibility is it when things go wrong?](#) *Water Policy* 4, 345–366.
- Kaduna State Government 2016 Kaduna State Water Supply and Sanitation Law 2016: A law to provide for the development and regulation of the Kaduna State water sector and other

- matters connected therewith law no 11. Kaduna State Government, Nigeria.
- Kanayo, O. 2014 Poverty incidence and reduction strategies in Nigeria: challenges of meeting 2015 MDG targets. *Journal of Economics* **5**, 201–217.
- Kang, D. & Lansey, K. 2012 Multiperiod planning of water supply infrastructure based on scenario analysis. *Journal of Water Resources Planning and Management* **140**, 40–54.
- Karamouz, M., Moridi, A. & Nazif, S. 2010 *Urban Water Engineering and Management*. CRC Press, Boca Raton, FL, USA.
- KDSG 2016 Kaduna State 2017 Water and Sanitation Sector Implementation Plan (SIP) 2017–2019. Public Draft. Kaduna State Government, Nigeria. <http://mobp.kadgov.ng/wp-content/uploads/2017/02/Water-and-sanitation.pdf> (accessed 20 April 2017).
- Kingdom, B., Liemberger, R. & Marin, P. 2006 *The Challenge of Reducing Non-Revenue Water in Developing Countries—How the Private Sector Can Help: A Look at Performance-Based Service Contracting*. *Water Supply and Sanitation Sector Board Discussion Paper Series; No. 8*. World Bank, Washington, DC, USA. <https://openknowledge.worldbank.org/handle/10986/17238>. License: CC BY 3.0 IGO.
- LWC 2010 *Lagos State Water Supply Plan*. Lagos Water Corporation, Lagos, Nigeria.
- LWC 2016 What you need know about Lagos Water Corporation. 2017. Available: http://lagoswater.org/lwcweb-lauch.php?page_id=232.
- Macheve, B., Danilenko, A., Abdullah, R., Bove, A. & Moffit, L. J. 2015 *State Water Agencies in Nigeria. A Performance Assessment*. World Bank Group, Washington, DC, USA.
- Morris, J. C. 2017 *Planning for water infrastructure*. *Public Works Management & Policy* **22**, 24–30.
- Myers, M. D. 2013 *Qualitative Research in Business and Management*. SAGE Publications, Washington, DC, USA.
- OECD 2015 OECD Principles on Water Governance welcomed by ministers at the OECD ministerial council meeting on 4 June 2015. Organisation for Economic Co-operation and Development, Paris, France.
- OECD 2016 *Water Governance in Cities. OECD Studies on Water*. Organisation for Economic Co-operation and Development, Paris, France.
- Oramah, I. T. 2006 *The effects of population growth in Nigeria*. *Journal of Applied Sciences* **6**, 1332–1337.
- PAI 2011 *Why population matters to water resources*. Population Action International, Washington, DC, USA.
- Rogers, P. 1996 *America's Water: Federal Roles and Responsibilities*. MIT Press, Cambridge, MA, USA.
- RSMWRRD 2012 *Rivers State water policy 2012*. Rivers State Ministry of Water Resources and Rural Development, Nigeria.
- Saunders, M., Lewis, P. & Thornhill, A. 2012 *Research Methods for Business Students*. Pearson Education, Harlow, UK.
- Seppälä, O. T. 2002 *Effective water and sanitation policy reform implementation: need for systemic approach and stakeholder participation*. *Water Policy* **4**, 367–388.
- WHO/UNICEF 2017 *Progress on Drinking Water, Sanitation and Hygiene. 2017 Update and SDG Baselines*. World Health Organization (WHO) and the United Nations Children's Fund (UNICEF), Geneva, Switzerland.
- World Bank 2011 *Nigeria – Water Supply and Sanitation in Nigeria: Turning Finance Into Services for 2015 and Beyond. An AMCOW Country Status Overview*. World Bank Group, Washington, DC, USA.
- World Bank 2017 *International Benchmarking Network for Water and Sanitation Utilities*. World Bank Group, Washington, DC, USA.
- Yin, R. K. 2013 *Case Study Research: Design and Methods*. Sage Publications, London, UK.

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