Management of Infrastructures in Water Sector: A Veritable Tool for Healthcare and Sustainable Development in Nigeria

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Abstract. There are a lot of health issues traceable to water sector in most developing nation of the world. Despite water rights and lots of researches in water resources engineering, strategic management of infrastructures still requires urgent and adequate attention for better healthcare delivery and sustainable development in Nigerian water sector. This paper assessed the operations of government, private and agencies involved in the supply and management of water resources. Data were collected through reconnaissance survey, literature review and interview of stakeholders in selected establishments. Challenges of this sector were checked and appraised with special focus on health implications, adequacy of supply, management and maintenance of infrastructures. Current trends within the administration of development comes were checked. Strategic management tools were place in place for effective handling of care, adequate funding, capability building, technological advancement and innovation in water sector. The study concluded that adequate attention should be given to strategic management of water sector to tackle healthcare issues and water challenges for accomplishment of infrastructural development in Nigeria. It was recommended that government; engineers, researchers and all stakeholders should embrace productive activity, viable policies, pollution management, innovative analysis, acceptable funding, technological advancement, manpower development and sanitation of water sector in all ramifications.

Key words: Strategic Management, Health Issues, Water Resources Engineering, Sustainable Infrastructures, Manpower Development

1. Introduction
Water infrastructure requires strategic management in all ramifications for the achievement of sustainable development goals and for better healthcare delivery. Amidst various healthcare interventions, national issues, engineering inputs, agenda, policies, development plans, sustainable development goals (SDG) and a host of others, Nigerian government has not achieved the desired goal in water sector. Developmental goals for developing nations includes adequate water supply, poverty eradication, unemployment; educational advancement, excellent healthcare delivery, socio-economical development, housing and food to every citizen. Strategic management is highly required in water development organizations. Strategy should be given priority in the modification of previous management activities for better outcome [39-41]. There are copious challenges facing public water supply in Nigeria such as inadequate data, funds, manpower development and poor maintenance of infrastructures [2-8].
Public water utilities issues include legal framework, environmental issues, cultural and other technical and socio-cultural issues [9]. Urbanization aspects, insufficient assets, mismanagement and regulative framework are major challenge in the country [10].

The essential economic problems concern the requirement to foster property speedy economic process will assist Water Corporation. [11-16]

The housing demand for water in the metropolitan areas (120–150 liter per capita per day (lpcd)) complied with 120 lpcd national normal water demand [17,18, 22].

Wastewater management is in forefront of advancing health, economy, urbanization and temperature change, infrastructural growth. [23,24,25].

Civil Engineering infrastructures have a lot of impacts on the environment and sustainable development. Impacts of infrastructures should be evaluated with special focus on the planning, maintenance and implementation of civil infrastructures that preserve natural environment [1, 27, 28, 29].

Water transport in Nigeria is proscribed to the areas enclosed by water. It is oftentimes employed by those living in the water-side and features a mean share of regarding one.6 % of Nigeria’s gross domestic product. Water transport involves each native and international movement [30,31].

Individuals will determine the way to create property lifestyles decisions, employment and creative development especially in water sector [32].

Environmental property means the climate system is stable, variety is preserved, ecosystems operate well, fresh is secured, and rural and concrete settlements area unit protected against pollution and area unit resilient to climate shocks.

2. Healthcare Provision System in Nigeria

Health of Nigerian must be protected in all areas especially in water resources aspect. Water provision has a long way to go in health care and infrastructural preservation. Health and national security of populace should not be endangered [33-36].

Figure 1 presented National Health Act [37-38].

![Figure 1: 2014 National Health Act](image-url)
3. Methodology
Operations of government, private and agencies involved in the supply and management of water resources were assessed. Data were collected through reconnaissance survey, literature review and interview of stakeholders in selected establishments. Challenges of this sector were checked and appraised with special focus on health implications, adequacy of supply, management and maintenance of infrastructures. Figure 2 indicates the map of Nigeria based on geopolitical zone.

Figure 2: Nigeria’s Geopolitical Zones

Figure 3 indicates the relevance of security-sustainability assessment framework in healthcare and water sector.

Figure 3: Relevance of Security-sustainability assessment framework

River basins authority in Nigeria such as Ogun – Osun and other agencies are trying their best in Nigeria.

Figure 4 indicated links between climate, agriculture, management and sustainability.
Figure 4: Links between Climate, Agriculture, Management and Sustainability

4. Discussion of Findings

Water sector and healthcare delivery are linked with economic, social, ecological and environmental sustainability as indicated by Figure 5. The health and well-being of individuals and populations is suffering from many wider environmental determinants. Figure 6 presented recent Water Supply Projects in Nigeria.

There is need to strengthen water supply programmes and projects in order to enhance their performance.

Safe drinking water is fundamental to health, survival, growth and development. While the goal of improved management of the water sector is no doubt a worthy goal, experiences from other parts of the world where the World Bank has pushed through the privatization of water reveals at best a mixed result with the common fallout being the systematic denial of the poor who cannot afford the exorbitant rates imposed by private water companies of the right to safe water. For new approaches to financing water supplies needs to be checked before implementation.
Figure 6: Developmental Projects related to Supply of Water

Figure 7 gives an illustration of Transformation for 2050 projection conceptual framework.

Figure 7: Transformation for 2050 projection conceptual framework

5. Challenges in water resource management in Nigeria

There are a lot of challenges facing our healthcare delivery which can be traced to water sector. Some of the challenges are highlighted as follows:

i. High water stress as a result of Increase in Water demands far above population growth in Nigeria.

ii. Regulation of water and processing of water licenses to qualified service provides by putting necessary law in place.

iii. Increase in climate change due to frequency of flooding, drought, groundwater pollution, groundwater overdraft, groundwater contamination, degradation of land and water.

iv. Inadequate attention to the link between water sector and healthcare delivery system.

v. Lack of cooperation for financing for sustainability; local, and International and regional basis.
vi. Infrastructures that can attract productive engagement of local and foreign investors should be encouraged.

vii. Government should bring strategic management into the financing and operation of water sector administration.

6. Strategic Management Approach of Infrastructure in Water Sector
The strategic management approaches for sustainable development of water sector in Nigeria are:

i. Adequate and planned provision of water infrastructure that can enhance sustainable development in the ministry of water resources.

ii. Good Governance in the administration of water sector.

iii. Effective communication among government, populace and stakeholders.

iv. Sustainable infrastructure therefore needs to be planned, designed, delivered, managed and decommissioned to minimize its negative impacts and maximize its positive impacts.

v. Adoption of integrated water resource management to execute the plan and review progress on a regular basis.

7. Conclusions
The following conclusions were made as a veritable tool to healthcare and water sector:

i. Appropriate attention must be given to strategic management of water sector to tackle healthcare issues and water challenges.

ii. The sustenance of the sustainability concept is hinged and underpinned by the integrated water management concept for infrastructural development. Strategic management approaches for sustainable development of water sector will improve public health in Nigeria.

iii. This strategy must be communicated through the organization to form broad support in private and public industries.

iv. Whenever a strategic management of infrastructure is adopted in water sector, it will revive the healthcare and enhance sustainable development goals.

v. It has been observed that only a few companies are clearly managed strategically, and all of them are multinational, diversified, manufacturer concerns.

8. Recommendations
Specific recommendations for strategic management and resolution of issues in water sector situation in Nigeria include:

i. Government; engineers, researchers and all stakeholders must embrace productive activity, viable policies, pollution control, innovative research, appropriate funding, technological advancement, manpower development and sanitation in all ramifications of health and water sector.

ii. Supervise the day-to-day operations by the various departments to ensure their efficiency and effectiveness;

iii. The Infrastructure Concession Regulatory Commission (ICRC) should be drastically supported and improved for optimal benefit of water sector.

iv. Management of infrastructures should be given adequate priority for better healthcare delivery and sustainable development in developed and developing countries.

v. Future policies, legal framework and water projects should take cognizance of strategic
management, capacity building, productivity and financing of water related research into consideration.

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