

## A Determination of Water Supply Budget for the Realisation of Vision 20, 2020 in Adamawa State, Nigeria

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### *Abstract*

*This paper was designed to determine the water supply budget that would enable Adamawa State Government, Nigeria realize the objective of vision 20, 2020 in respect of water supply in the State. It made use of secondary data obtained from Adamawa state water Board, Adamawa State Rural Water supply and Environment Sanitation Agency and Federal Office of statistics in Federal Government Secretariat, Yola. Water supply budget (response variable) and Population size (explanatory variable) are the two parameters examined to determine how realisable is the vision 20, 2020 in respect of water supply in Adamawa State. Secondary data on the two variables were obtained for the period (2002 -2010) and were tested, using covariance and correlation analysis to determine the strength of linear relationship between the two variables. The confirmation of positive linear relationship between variable enable the researcher to conduct regression analysis in order to forecast the water supply budget for the period, leading to the year 2020. The forecasts reveal that water supply budget will grow on the average by 4.3% between year 2015 and 2020. This growth rate surpasses projected annual population growth rate of 3.2 % in Adamawa State. The Implication of this finding is that Adamawa State Government will be able to improve water supply converge which is a key focus of vision 20, 2020. In order to perform this feat, institutional empowerment was recommended to the government of Adamawa State. The State's water parastatal, Adamawa State water Board is to be supported technically, financially and in all aspects of management. The significance of the paper cannot be over-emphasized. Its findings are optimistic and re-assuring to the government of Adamawa State that vision 20,2020, in respect of water supply, can be realized in the state.*

**Key Words:** *Water, Budget, Population, Vision, 20, 2020, Determination.*

### **Introduction**

Water is life and it is the most essential basic need for existence. Without water, there is no human existence. Water is composed of two molecules that are hydrogen and Oxygen. It is natural and it constitutes about one- third of the world's land mass in the forms of oceans, seas, lakes and rivers.

Oxford Advanced Learner dictionary of current English (1945:1345) define water as liquid without colures, smell or taste that fall as rains, is in lakes, rivers and seas and is used for drinking, washing, cooking farming etc. The word, availability is defined by the same dictionary as things that you can get, buy and find. as water is essential, its availability is of most concern to every society such that it will provide a means of domestic, agricultural, manufacturing, industrial and others uses.

According to the new Webster Dictionary of English Edition (1980) water is a liquid which in its more or less impure state constitute rain, oceans, lake and rivers and which in its pure state is a transparent, odourless and tasteless liquid, a component of hydrogen and oxygen. Water makes life possible as without it, life and civilization cannot be developed or survived.

As observed by Vermersch (1996: 6-7) water is special in the sense that it has a special role in community's perception. Subconsciously people recognize that it is vital to their everyday existence. It has association with health purity and beauty. Water is usually thought to be abundant and available gifts from nature that ought to be free of charge.

Increasing pressures of population growth, urbanization, costs, shortage of resources, environmental pressures, and evolving technology are causing rapid changes. These changes require level of investment that most politicians are unable to reconcile with other political imperatives.

Oyebande (1995:19) also stated that water is one of the indispensable chain links of a national economy and has many uses for man other than human consumption. It is necessary for industrial uses, for irrigation in areas of insufficient rainfall and in generation of electric power. If water resources are carefully planned and supervised, they can also help to meet growing demand for out door recreation transportation and communication.

Water as natural phenomena exist or can be obtained from two main sources. The sources are surface and ground water. Surface water refers to the sources of water that exist in their natural state, this include rain, rivers and lakes. On the other hand, ground water refers to the sources such as boreholes, wells and springs which are purer than the surface water. Being a vital element in the lives of all living things and considering its pathogenic nature i.e. ability to transmit diseases and micro-organisms, water need to be treated to become fit for drinking or what is known as portable or pure water.

According to Adejuyigbe and Oke (2006) pure water is that which is suitable for drinking and a commodity, very scarce to come by in so many communities; both rural and urban. In extreme cases of water scarcity, water related diseases such as typhoid and paratyphoid fevers, dysentery and cholera are common place.

Availability of an adequate and dependable supply water for domestic, agricultural and industrial purpose is vital for a meaningful and sustained social and economic development (Mabogunje, 1965) cited in (Ayoade and Oyebande, 1978). Industry in particular makes use of water as an ingredient with other raw materials to create finished products as a transporting medium, as a cleansing agent and as a source of steam for heating and power generation.

In Nigeria, like in most developing countries of the world it is very difficult for people to get constant supply of water, hence people have learn to purchase the scarce commodity from tankers and water vendors. Unfortunately, water scarcity has retarded the rate of economic growth, because it led to the shortage of water supply to industries for commercial purposes. Most industries use boreholes to generate water for their consumption. Such boreholes do not have a wider network to supply water into places where it is needed. This makes water unavailable. However, despite the awareness of the existence of the aforementioned water-related problems by the cited studies and authors, one major gap is that the studies and the authors overlooked the significance of relationship between water supply budget and population. This paper examines this gap. The main objective of the study, therefore, is to determine the water supply budget for realization of vision 20, 2020 in Adamawa State, Nigeria. Being a stake holder in the formulation of the vision 20,2020 of the federal government of Nigeria, the study examines the effort of Adamawa State Government , in order to enable us conclude on how realistic is the vision in the state, in respect of one of its key objectives that is, water supply. That is, the objective is to determine the monetary

allocation to water supply in Adamawa State, Nigeria. Other specific objective are to determine the linearity between water supply budget and population size in Adamawa State and to forecast the water supply budget that will enable the state to realize vision 20,2020 in respect of water supply in the state. Consequently, the study addresses the following questions:

- i. How related are the water supply budget and population size in Adamawa State?
- ii. What amount of budgetary allocation will guarantee sustainable water supply in Adamawa State?
- iii. How realizable is the vision 20, 2020, in respect of water supply in Adamawa State?

## **Literature Review**

This section examines the in alienable roles of an uninterrupted water supply in socio- economic development of a country.

### **The Role of Water in Socio Economic Development**

Socio Economic development simply means advancement of a given society to a higher level of welfare or well-being. It implies advancement of society on a broad front and includes both materials and non-materials element and its scope are broader than that of economic growth. Among the objectives of socio economic development are the following:

- a. The reduction of pain and suffering associated with such factors as inadequate nutrition and unhealthy living conditions
- b. The improvement in non-materials benefit such as personal liberty, cultural and national identity national unity, national and personal security, educational opportunity and freedom from inequity and dependency ( Lipsey and Dauglas, 1987)

It has been recognized that economic growth alone cannot reduce poverty among low income groups so that they can exist simultaneously with other segments of the population enjoying a relatively high standard of living. As a result an approach to development that concentrates directly on the needs of the poor “the needs” approach has arisen.

The roles of water in Socio economic development cannot be isolated and defined independently of other development factors.

Waters role in development generally is closely associated with the roles of complementary factors and the existences of favorable water resource conditions (Mabogunje, 1965). Without the availability of complementary development factors, water is not likely to be sufficient in itself to ensure development.

Gunnar (1993) identified three development phases in relation to water:

- a. Pre- industrialized societies where water is abundant and characterized by less human influence. Under such condition, water is considered free gift and easily accessible
- b. The phase of active water exploitation where dams are built to generate power or for irrigation or both.
- c. The third development phase, the maximum attainable and acceptable level of stream flow of regulation has been reached in many river basins.

In all of the three phases, water is a necessary factor for socio –economic development. It is part of the social infrastructure playing a role in both industrial production and societal and consumption for human

welfare. Water resource for drinking and economic growth are part of a nation's social capital, a necessary foundation for successful national socio economic growth and well being of the population.

### **Portable Water Supply**

Municipal officials thorough out the world seldom have a shortage of problem with which to wrestle – tight budgets, complaining residents, and growing population (twort, Larr and Crowdley 1985) However, two problems can exist which will strike at the very existence of a city. One is how to acquire an adequate supply of water. The other is how to dispose the used water. Both must be solved if the city is to remain viable (Gunnar, 1985). In a world of 6 billion people, providing water is already a serious and challenge straining on the water management system and institutions. Indeed some eighty countries with 40 percent of the worlds population already suffer from serious water shortage (Peter, 1993).

A moderate increase in demand for water can usually be met by city provided there is still a rough equilibrium between the number of people, the availability of energy and the size of the water distribution system. Unfortunately this equilibrium has been shattered in some third world countries. In those metropolitan areas the authorities have lost the ability to keep up with the control of their water because of the rapid population increase due to the tremendous migration of people from villages into cities. Some urban centres have been growing at rates of 5 to 10 percent per year (Gunnar, 1985).

### **Water Quantity**

Water resource vary widely in regional and local patterns of availability. The Supply is dependent on topographic and metrological conditions as they influence precipitation and evapotranspiration. The amount of water stored in a place is dependent to a large extent on the physical features of the earth and on the earth's geological structure. Orloci et al(1985) observed that in the early stages of a national's development the quantity of water is seen as the most pertinent factor. However polluted water is responsible not only for about 80 percent of all illness, but also for massive disturbance of aquatics ecosystems. Consequently in a world with a rapidly growing population, water quality management should become as important as water quantity management is today. The amount of water used the manner in which it is used and the degrees of treatment to which it must be subjected depend on many factors. These includes

(a) Population trend (b) Level of urbanization (C) Level of Industrial development (D) Level of Agricultural development (e) Energy cost (f) Extent of water based recreation (g) The nature of water-quality management programmers (h) Water pricing policy (i) Environmental enhancement and protection consideration and (j) the nature of water related institutions.

The World Health Organization (WHO, 1979) research on availability of portable water in developing countries show that 57% of the 57 developing countries have access to stand pipes while just 20 percent of the rural people have reasonable access to safe water. For rural and urban population put together only 35 percent are adequately served (Nwafor, 1981).

### **Water Conditions In The Study Area**

The study area is Adamawa State which is located in the North –East Geo – Political Zone of Nigeria. Before the establishment of Adamawa State water Board Corporation, Adamawa State was facing a serious lack of water availability. In order words, the main sources of water were wells, streams and few numbers of boreholes. Due to the weather, geographical location, topography and with the increase in population, existing sources had been overstretched hence the need arises for the government to take immediate action to address water supply challenge in the state.



Apart from the Kiri dam constructed on river Gongola for irrigation purpose there is no standard dam for domestic water supply in the state. The water supply scheme in the state capital is from the surface water from the river Benue which is passed through treatment plants before going into the distribution system. The plant pumps about 21.378 millions liters of water per day to Yola, the state capital. The figure is far from being adequate for the estimated 120,555 people living in the city. For other cities and towns water supply is principally from the boreholes and wells supplemented with water obtained directly from the river during the rainy season. Water as physical resources in Adamawa State is not inadequate. At present with resources such as the river Benue and hundreds of perennial stream and rivers and with the high potential of underground water in the area s underlain by sedimentary rocks, there should be no problem whatsoever. further more rainfall in the state which ranges from 700mm in Guyuk area to 1600mm in Teungo area also indicate that much water is available in the state if properly harnessed and managed the water resources in the state is adequate for the utilization and sustainable development of the state.(Adebayo et al 2004) .

Although the surface water of the state is enormous they are unevenly distributed in time and space. The climate of the state controls the regime and other characteristics of the rivers.

Surface water is not available during the dry season except in the few deep ponds and lakes such as Njuwa Gerio etc Similarly the ground water level on the basement complex structure falls rapidly during the dry seasons due to high evapo transpiration

The water corporation also have over 179 serviceable boreholes scattered all over the state. The corporation is also engaged in sinking of wells and is also harnessing the surface water resource through construction of earth dams, ponds to be used by farmer for fishing and for consumption of animals and watering of plants and crop by farmers during dry season. The water corporation provides good source of employment to well over 1200 employees. This figure comprises of the staff of the corporation in headquarter and all the state units it have for its operations.

The Adamawa State water corporation however faces a lot of difficulties. The problems vary both in nature and complexity. Most of these problem run in vicious circle and a solution of one leads automatically to solving wholly or part of the others. In a sort of chain reaction some of the major problems are identified as follows:

- I. The corporation is inadequately funded which is the major constraint on the effective implementation of water supply development facilities; the water supply project are capital intensive, while the running and maintenance of water supply undertakings entailed a high recurrent expenditures
- II. Institutional weakness that result in failure to collect adequate charge from water users due probably either to lack of financial policies or to in effective means of collection inability to monitor and protect effectively pipelines and other infrastructure could be traced to institutional weakness,
- III. Frequent failures in the systems due to poor operation and maintenance procedure or spare part s.
- IV. Lack of others infrastructural element as most water supply projects are not independent project that exist alone, for instance there must be electric current to supply power for pumps lacks of this and other infrastructural elements make good functioning of water supply system impossible .

Paucity of data for effective planning to suit the requirement. Such data can be grouped as follows:-

Group A: - Technical Topography, Geology, Hydrogeology (Surface and ground water) meteorology.

Group B: - Socio –economic, population and Migration per capital consumption trend total demand trends general and population

Group C: - Political, National Development, programme and priorities, budgets restrictions and political trend.

Group D: - Exchange rate related cost of naira has led to large increase in the cost of imported inputs into water production such as chemicals and spare parts

### **Methodology of the Study**

The focus of the study is the vision 20,2020 of the federal government of Nigeria. The vision seeks to elevate Nigeria economy to the twentieth economy in the world by the year 2020.

In order to realize the vision, public authorities in Nigeria seek to achieve appreciable level of growth in certain key sectors of the economy notably water supply sector. This study therefore examines the trend of budgetary allocations to water supply in Adamawa State Nigeria in order to determine if such allocations are sufficient enough to enable the government of the state realize vision 20,2020 in respect of water supply. The study was conducted with the aid of secondary data obtained from Adamawa State Water Board, Adamawa State Rural Water supply and Environmental Sanitation agency and Federal Office of statistics in Federal Government Secretariat Yola. Water Supply Budget was used as the response variable while population size was the explanatory variable. Researcher collected secondary data on the two variables for the period of (2002-2010). The Researcher tested the strength of linear relationship between the two variables in order to establish if the outcome could be used to forecast water supply budget for the year ahead. Using covariance and correlation coefficient analysis as tool the researcher was able to forecast water supply budget in Adamawa State for the year 2020. An examination of the growth rate of the forecasted water supply budget, compared to the population growth rate of the state enable the researcher to conclude on how realisable is the vision 20,2020 in respect of water supply in Adamawa State. The major limitation in respect of the methodology adopted is that the population size beyond year 2006 is derivative. However, this does not affect the validity because it is based on official projected growth rate.

### **Discussion and Finding (I)**

How related are the water supply Budget and population size in Adamawa State?

Table 1 which provides data on the responses variable (water supply budget) and explanatory variable (population size) will enable us to determine the strength and direction of linear relationship between the two

Table 1:- Water supply budget and population size of Adamawa State, Nigeria (2002 – 2010).

YEAR	Approved water Supply Budget (#Million)	Population (Million people)
2002	133.6	2.79
2003	75.0	2.88
2004	193.0	2.98
2005	345.0	3.10
2006	300.0	3.20
2007	280.0	3.30
2008	232.0	3.40
2009	152.5	3.50
2010	152.5	3.61

Source :- Adamawa State Water Board, Yola and Federal Office Statistics Federal Government secretariat Yola Adamawa State

Measuring the strength and direction of liner relationship between water supply budget and population size in Adamawa State, we use the data in table 1 in which  $\bar{Y} = 207.1$  and  $\bar{X} = 3.20$

$$\text{Consequently } COR_{(Y,X)} = \frac{62.803}{\sqrt{62595.12 \times 0.637}} = \frac{62.803}{199.68} = 0.315$$

Correlation coefficient of Y and X which is 0.315 indicate That positive linear relationship exist between water supply budget (y) and population size (X) in Adamawa State, Nigeria.

**Discussion and Finding (II)**

What amount of Budget allocation will guarantee sustainable water supply in Adamawa State, Nigeria? Such allocation can be determined with the aid of regression analysis which is an extension of correlation analysis. In order to determine such budgetary allocation the population size of Adamawa State is to be computed up to the time scope of the year 2020. This is achieved by using the official population growth rate of 3.2% per annum. The projected population size of the state is therefore derived as follows:

Table 2: Projected population size of Adamawa State, Nigeria (2010-2020).

Year	Population Million People
2010	3.61
2011	3.72
2012	3.84
2013	3.96
2014	4.19
2015	4.22
2016	4.36
2017	4.50
2018	4.64
2019	4.78
2020	4.94

Source:- Projected population size of Adamawa State, Nigeria based on Official growth rate of 3.2 %

If response variable (water Supply budget ) is demoted by Y and the explanatory variable (population size) is denoted by X the liner model will be

$$Y = \beta_0 + \beta_1 X + E.$$

Where  $\beta_0, \beta_1$  are constant called model regression coefficient or parameters and E is a random disturbance or error. Through this model we can forecast the water supply budget of Adamawa State between 2015 and 2020.

Consequently water supply budget =  $\beta_0 + \beta_1 \text{ pop size} + E$

$$\beta_1 = \frac{62.803}{0.637} = 98.59$$

$$\beta_0 = \bar{Y} - \beta_1 \bar{X} = 207.1 - 98.59 (3.20) = -108.39$$

Then, the equation of least squares regression line becomes:

$$\text{Water supply budget} = -108.39 + 98.59 \text{ pop size.}$$

Using this equation of the least square regression line above, water supply budget of Adamawa State between year 2015 and 2020 is forecasted in the table below.

**Table 3: Forecast for water supply budget in Adamawa State, Niegra (2015-2020)**

Year	Projected population Size (Million people)	Forecast for water supply budget (Million Naira)
2015	4.22	307.66
2016	4.36	321.46
2017	4.50	335.27
2018	4.64	349.07
2019	4.78	362.87
2020	4.94	378.64

The figure arising from the equation of least square regression line reveal that budgetary allocation to water supply in Adamawa State in year 2015 should be #307.66 million. This allocation should grow on average by 4.3 % per annum's and increase to #378.64 million naira in 2020.

### **Discussion and Finding III**

How realisable is the vision 20, 2020 in Adamawa State Nigeria? Official projected population growth rate in Adamawa State, Nigeria is 3.2% per annum, causing the population of the state to grow from 3.61 million people in year 2010 to 4.94 million people in year 2020 . On the other hand equation of the least squares regression line reveal that mid-way to the year 2020, that is, from year 2015 up to the year 2020, forecast growth rate for water supply budget hobble around 4.3% .That is to say that if the population of the state is to grow at the projected rate of 3.2 % per annum forecast growth rate for water supply budget over the same period should be in the average of 4.3%. The realisation of vision 20,2020 in respect of water supply in Adamawa State will be dictated by how committed is the state government in the realization of the Vision. If the state government is determined and ensure that investment in water related projects grow on average by 4.3% per annum which outstrips the population growth rate, it is safe to conclude that the state will make appreciable progress in respect of water supply coverage by the year 2020.

### **Summary and Conclusion**

The research work emphasizes on the importance of water toward the growth of a nation. In its unique nature water is useful for domestic, agricultural and industrial purpose. This explains the reason why the development of water supply sectors is one of the focuses of vision 20,2020 of federal government of Nigeria. How ever despite the great emphasis that the public authorities has placed on its development the meteoric rise in the population has been hampering sustainable water supply effort at the federal, state and local levels. Hence this study examines water supply from investment perspective. it sought to assess Adamawa State Government's Effort based budgetary allocation to the water supply sector Believing that little or no progress will be made regardless of financial commitment to the water supply sector if such effort fails to address the high rate of population growth, the research sought to examine water supply budget vis-à-vis the population size in Adamawa State. Using the covariance and correlation analysis to test the strength and direction of linear relationship between the population size and the water supply budget, it was confirmed that positive relationship exit between the two variables. This finding was complemented by



the regression analysis which is used in forecasting water supply budget for the years ahead. The forecast reveals that it is possible for water supply budget growth rate to outstrip the population growth rate in Adamawa State. If the former's forecasted growth rate hobbles around 4.3% per annum, official projected growth rate of latter is 3.2%. The significance of the finding cannot be lost on Adamawa state government. It makes the government to be optimistic that vision 20, 2020 in respect of water supply can be realised in the state with determination, political will and persistent financial commitment. To realize this vision however institutional empowerment is recommended Adamawa State water Board should be supported technically. Financially and in all aspect of management. The combination of the aforementioned will serve as impetus in the realization of the vision in Adamawa State.

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