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GOVERNMENT UTILITY INVESTMENT AND CONSTRUCTION INDUSTRY CONTRIBUTION TO GROSS DOMESTIC PRODUCT (GDP) IN NIGERIA

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ABSTRACT

Purpose: This study investigated the impact of the Nigerian government's capital expenditure in utility development over two consecutive decades, on the construction industry's contribution to Gross Domestic Product (GDP).
Design/methodology/approach: The levels of the Nigerian government's expenditure on the development of utilities between 1999 and 2019 and the contribution of the Nigerian construction industry to GDP were evaluated. The impact of the former on the latter was also assessed. Data on government capital expenditure on power and water and the construction industry's contribution to GDP were sourced through secondary means. The data were analysed using descriptive and inferential statistics using Spyder software, version 3.7.3.
Findings: The findings of the study offered prediction graphs forecasting the future behaviour of capital expenditure up to the year 2025. The result equally showed that the contribution of the construction industry to GDP from the year 2000 to 2019 increased continuously. The regression coefficient (R^2) between capital expenditure on power and water, and the construction industry's contribution to GDP was 0.986.
Research limitations/implications: The limitations include the use of only two types of utility to determine the contribution of the construction industry to GDP. The contribution to knowledge is that this study unearths the impact of the selected utilities on the construction industry's contribution to GDP.
Practical implications: It was concluded that the impact of the government's investment in the development of utilities between 1999 and 2019 on the construction industry's performance within the years under review was significant. The study recommended improved government investment in utility development to enhance the construction industry's contribution to GDP, thereby improving its performance.
Originality/value: This study revealed the contribution of the construction industry to the national gross domestic product (GDP) and the Nigerian economy at large. The government investment in utility [the capital expenditure on power (GEOP), and the capital expenditure on water (GEOW)] carries a significant impact on the construction industry's contribution to the GDP (CICGDP) in Nigeria.

Keywords: Construction industry; GDP; government capital expenditure; utility investment.

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1. INTRODUCTION

Construction involves building, maintaining, and repairing structures usually classified into commercial, residential, and social buildings, civil and military structures, road works with their ancillary structures, and other heavy construction works such as dams, stadia, and the likes. Engagement in these types of activities is known as the process of adding structures to real estate. These activities are carried out by a branch of manufacturing and trade called the construction industry (Ametepey & Ansah, 2015).

The construction industry is described as a group of licensed professionals; such as civil engineers and services engineers, on one hand, and built environment professionals such as architects, builders, surveyors, and other allied professionals on the other hand; working as a team on a construction site to produce structures (Afolabi & Oyeyipo, 2017). According to Pheng and Hou (2019), the construction industry is that sector of the economy responsible for the design, construction, repairs, alteration, maintenance, refurbishment, and demolition of buildings, including the infrastructure and civil engineering works. According to Olowo-Okere (1985), the activities of organised construction contracting in Nigeria began in the 1940s, with few foreign companies coming into operation. The oil boom of the 1970s increased the trend of construction activities. Up to the end of the second republic in 1983, the construction industry in Nigeria experienced an upsurge in construction contracting which was dominated by foreign companies with few indigenous companies (Idoro, 2010). The construction industry is one of the most critical industries in a society because it supports economic activities. It, therefore, plays a significant role in the socio-economic development of a society.

According to Oladinrin *et al.* (2012), the construction industry's position in the economy, as well as its activities, are critical to achieving national socio-economic development goals of providing shelter, infrastructure, and jobs. Although the construction industry was left off of the list of significant economic growth factors, its activities affect every sector of the economy and are critical to its continued growth. The construction industry makes a noticeable contribution to the economic output of any country. It generates employment and income for the people (Ofori 2001). Okoye *et al.* (2018) reported that construction contributes between 3% and 6% of Nigeria's gross domestic product (GDP) from independence to the 1980s before it crashed down to 1% over the decades. It increased again to 3% in 2012. In 2016, the National Bureau of Statistics stated that the construction industry in Nigeria contributes about 4.13% of the total gross domestic product (GDP) within the first quarter of 2016 (National Bureau of Statistics NBS, 2016).

The construction sector accounted for 3.44% of real GDP in the fourth quarter of 2019, lower than its contribution of 3.48% in the same quarter of the previous year, but higher than the preceding quarter's 3.01%. In 2019, construction contributed 3.72% to real GDP (NBS, 2020). Its contribution to total real GDP was 3.47% in the fourth quarter of 2020; higher than its contribution of 3.44% in the same quarter of the previous year, and higher than in the immediate past quarter where it contributed 3.21%. In annual terms, the sector accounted for 3.50% of real GDP in the year 2020 (NBS, 2021). It is no doubt that the construction industry contributes to the economy in a significant way. Therefore, the performance of the construction industry needs to be given great attention. This means that every factor that could contribute to it in terms of cost, quality, health, and safety, client's satisfaction, end user's satisfaction, environmental and social sustainability, should also be given the utmost attention for it to keep boosting the economy. Oladinrin *et al.* (2012) showed the significance of the construction relationship with the aggregate economy through its contributions to the GDP. In the same vein, Abubakar *et al.* (2018) and

Olanipekun and Saka (2019) found that the GDP substantially affect the construction sector output. The study observed that the construction sector tectonically responded to economic shocks. Therefore, it implies that the level of performance of the construction sector in its contribution to the economic growth of a nation is dependent upon the government expenditure on infrastructural facilities that affect the sector.

The utility sector, independent of the construction industry, includes electricity, natural gas, coal, water, sewage, telephone, and transportation. But this study focused on water and electricity which are significant utilities and challenges in the construction production process. The International Energy Agency (IEA) estimated that nearly 70 percent of the world's electricity is consumed in residential and commercial buildings (UNEP, 2019). This usage does, however, vary widely according to geographical location, climate, and consumption patterns. The United Nations Environment Programme stated that no other sector has a high potential for drastic energy and water consumption like the construction sector (UNEP, 2019).

Public utility is no doubt necessary for economic development. Energy and water are vital to industrial activities; no sector can function effectively without adequate energy and water supply. Water, on the other hand, is an essential commodity in construction. During construction, water forms part of several activities on a construction site. Its form of use varies from operation to operation along the stages of construction. However, water is not seen as a material for civil and building construction. According to dos Santos *et al.* (2015), the cost of engineering services does not include water. Nevertheless, it is deemed essential in every construction contract. Concrete manufacturing, mortar, curing, cleaning, and latex paint are some of the activities that involve the use of water in construction.

Essentially, it is expected that the plot developer should provide general area lighting and water, and additional lighting for craftwork or task lighting. The developer, at this point, can take advantage of the government's already existing utility in that area of development, following due process, to provide electricity and water for the construction process. The government's failure to provide adequate power and water attracts a considerable cost to the developer and the industry to provide alternative means. This alternative is usually generated using fossil fuel, a significant source of CO_2 emission leading to greenhouse effects and costs. For instance, the Management of Abuja Municipal Area Council [Environmental Services (ESD) Bodies], notified industries, and warehouses, including Banks, of annual levies/fees for using a generator due to the discharge of harmful hazardous substances (Daily Post, 2021). The body cited sections 18, 20, 21, 25, 26, and 27 of National Environmental Health Practice Regulation 2016 and other relevant laws which confer on the council the power to regulate, enforce, inspect, control, and collect levies for such matters.

Studies on utilities in construction concentrated on the on-site energy use and utilities in buildings. For instance, Matthew *et al.* (2019) studied the relationship between electricity consumption, government expenditure, and sustainable development in Nigeria and concluded that electricity consumption, government capital expenditure, and total labour force had a negative but significant effect on gross domestic product per capita (GDPC) in the long run. However, Ndayiragije (2006) modelled the use of energy on construction sites and asserted that the elimination of energy wastage; enhances the construction company's operations productivity together with the improvement of the quality of its businesses and management; and prevents environmental pollution. Talukhaba *et al.* (2013) investigated the factors influencing the efficient use of energy on construction sites. The study showed that inefficient site management is a major constraint to the conservation of energy in the construction processes. Similarly, Uda *et al.* (2020)

dwelt on the factors influencing energy consumption in construction. The research found the top five influencing factors of energy consumption in construction projects to include the construction methods, the adoption of Building Information Modelling (BIM), heavy equipment planning, the certification of material suppliers and distributors, and workforce management.

Nevertheless, there is limited literature on the impact of government investment in the utility sector on construction industry performance. Some studies have examined the energy consumption of buildings and their environmental impacts but only a few considered the construction phase. Such studies were limited to various stages of material extraction, production, and transportation and did not include on-site construction processes (Chini & Shrivastava, 2011). However, the study by Susetyo *et al.* (2018) investigated the impact of capital expenditure on public utility consumers on the economic development of district cities in Sumatra in Indonesia. The study utilised quantitative analysis and estimation methods. Multiple least square method of panel data showed that the result obtained from the four variables used, which were a regional public utility, capital expenditure, the number of electricity customers, the number of water customers, and the number of telephone subscribers, showed a positive effect in the Gross Regional Domestic Product (GRDP). The study by Ojong *et al.* (2016) on government expenditure and its implications on Nigeria's economy recommended that government should increase its expenditure on economic services such as agriculture, construction, transport, communication, electricity, and other economic services to boost the country's economy.

The construction industry's power and water consumption during construction have hardly been a research focus because of their disintegrated nature and the involvement of many parties during the construction phase (Chini, & Shrivastava, 2011). This is responsible for, at the time of design and even before construction starts, the unpredictability of the quantity of the amount of power and water required and its impact during the construction phase, hence, their inclusion in project estimates as preliminary items. Conversely, this study determined the impact of government investment in utility on the construction industry's performance rather than on Nigeria's economy as a whole.

1.1. Objectives of the Study

Essentially, this study is concerned with the investigation of the impact of the government's capital expenditure in utility development in the last two consecutive decades on Nigeria's construction industry performance with the following objectives in view.

i. Determination of the level of the Nigerian government's expenditure on the development of utilities between 1999 and 2019.
ii. Evaluation of the level of contribution of the Nigerian construction industry to GDP in the last two consecutive decades.
iii. Assessment of the impact of the government's expenditure in utility development on the Nigerian construction industry's performance within the period under review.

1.2. Research Hypothesis

The null hypothesis postulated for the study states that the impact of the government's investment in the development of utilities between 1999 and 2019 on the construction industry's contribution to GDP within the years under review is not significant.

2. LITERATURE REVIEW

Whatever type of construction project is embarked upon; different forms of utilities are consumed before it is completed. Practically, in every form of construction engagement such as repairs, alteration, maintenance, refurbishment, and demolition, one form of utility or more is required which consumes part of the project fund and indirectly impact the performance of the constructor, and possibly resources necessary for its completion (Odesola & Adewuyi, 2016). In view of the complex nature of construction projects, the consumption and expenditure on the various forms of utilities in a project may differ for the performance of such projects. Nonetheless, power and water are among the commonest utilities consumed in most construction projects

2.1. Level of Government's Investment in the Development of Utilities

It has been noted that one issue Nigeria's economy is recently facing is the fact that about one-fourth to one-fifth of its national output is spent on consumption expenditure (Ebajemito *et al*., 2004). As a result, the Nigerian investment ratio always falls below the benchmark of the international investment/ GDP ratio of 20 percent, which is estimated to be worthy of enhancing economic growth (Usman, 2007).

Noteworthy, investment in some nations has not gone below 20 percent. As of the 70s, China had an average investment/ GDP ratio of about 30.5 percent; Korea had 28.4 percent; Malaysia had 22.9 percent, Singapore had 40.5 percent, and Thailand had 25.8 percent (World Bank, 2007). In the 80s, the averages increased to 36.2 percent, 30.4 percent, 27.8 percent, 42.5 percent, and 29.5 percent, respectively. In the 90s, the averages were also enhanced to 39.1 percent; 35.4 percent; 36.3 percent; 35.3 percent, and 36.3 percent respectively, and an average of 39.6 percent; 30.0 percent; 23.2 percent, 22.9 percent, and 25.7 respectively as between 2000 to 2005 (World Bank, 2007). However, Nigerian investment/ GDP outcome was not encouraging, though an improvement was recorded during the structural adjustment programme (SAP), which made the average investment/ GDP in the 70s to be 22.9 percent; in the 80s, it became 16.5 percent while in 90s, it became 19.8 percent but thereafter fell below the international benchmark (CBN, 2006). It is revealed that government investment in utilities was on the decline, and Nigeria spends less on Public Capital Spending amongst all countries (World Bank, 2007). Foye (2014), therefore, contended that the decline in government investment explains why Nigeria has poor infrastructural development; inadequate power supply, poor roads, and insufficient potable water.

2.2. Impact of Government's Investment in the Development of Utilities on Construction Industry performance

The impact of government investment in utility and other infrastructures development on construction industry performance can be achieved through an overview of the in and outflow of government expenditure and how the annual or quarterly government spending on utility reflects on the construction sectors through its contribution to the Gross Domestic Product (Oke, 2011). There have been controversies over the positive impact of government investment and performance. A study by Babatunde (2018) opined that government spending on utilities and other sectors under infrastructure in Nigeria seems to be a waste of scarce resources because the growth in the economy does not depict the massive spending by the government on infrastructural development. The study further pointed to the failure of electricity nationwide and water scarcity experienced in many areas of the country. On the other hand, Chan, Ramli, and Abdkarim (2017) noticed a deficiency

of government investment in economic growth as their finding noted the significant influence of the value-added tax (VAT) system in enhancing the efficiency of government investment

However, Nigerian economic development experiences a considerable rise in government capital expenditure both in utilities over the years giving cause for inquiry, especially on economic growth advancement and development. These challenges of raising additional funds and pursuing more tax revenues to cope with increasing government spending have attracted interest in the impact of government capital expenditure on utility development on construction industry performance.

Intense research has attempted to estimate the impact of public infrastructure investments on economic output. A recent review of the literature utilized meta-regression analysis to take advantage of the nearly 30 years of international research on the impact of investment on infrastructure and found that on average for the United States, a 1% increase in the public capital stock (about $138 billion in 2016) would result in a higher level of private-sector economic output by 0.083% in the short term (about $12.8 billion), compared with a baseline (Bom & Ligthart, 2015). According to Edame *et al*. (2010), investment in infrastructure stimulates or crowds in private investment, reduces cost, and opens new markets, thereby engendering profits and employment. Public utilities such as roads, electricity, bridges, sea, and airports, if adequately financed with the appropriate financial instruments, bring about economic growth and development, which will, in turn, impact the construction industry performance (William, Okonkwo & Abolore, 2014).

More recently, infrastructure has become the pillar of the budget of Nigeria; in 2016, infrastructure received the highest capital appropriation of ₦690.79 billion, which represents 54% of capital appropriation in the 2016 annual budget. A total sum of ₦577.42 billion representing 83.59% of annual appropriation was released in May 2017. Further breakdown of the figures reveals that the power, works, and housing sector received ₦307.4 billion, followed by the transportation sector which received ₦188.67 billion; water resources received ₦46.08 billion, science and technology received ₦27 billion, and communication technology received ₦7.7 billion (Ministry of Budget and National Planning (MBNP), 2017). The MBNP (2017) reveals that capital expenditure on these sectors of the infrastructure had an impressive performance which is 74.41% of released invested in the provision and renewal of critical infrastructure in the country.

However, it has been noted that budgetary investment in the works and housing sector provides the requirement that facilitates infrastructure and housing productivity and low cost of doing construction works. The fourth-quarter (Q4) whole sector report of the NBS (2017) on Electricity, Gas, and Air conditioning supply points to a nominal year to year growth of 11.8% in the fourth quarter of 2016, which is 8.74% higher than the growth rate of 2.43% recorded in the corresponding quarter of 2015 and 7.21% points higher than the growth of 2.9% recorded in the third quarter of 2016. This sector grew quarter on quarter to a nominal GDP of 62.07% and contributed 0.56% to nominal GDP. In the construction sector, NBS (2017) reported that the sector grew by 7.66% in nominal terms in Q4, 2016. The growth was higher than 4.14% and 2.81%, recorded in the same quarter of 2015 and 2014 respectively. The sector contributed 3.41% to the real GDP. However, the power, works and housing subsectors were good with a 71.16% utilization rate. The sector's primary role is to ensure a practical approach to sustainable integrated water resource management by increasing access to water supply and sanitation. It was the basis of the budgetary allocation focused on constructing a multipurpose dam for irrigation, safe drinking water, sanitation, and other health-related issues. The water resource sector was allocated ₦46.54 billion, representing 91.11% of its total appropriation in the 2016 budget.

An average budget utilization rate (BUR) of 99.62% was achieved. The ministry of water resources utilized 99.99% of the funds it releases, while its parastatal utilized 98.84% of the total amount released. Analysis of the performance scorecard revealed that the increase in the indicator's performance is not impressive. The number of dams constructed increased from 39 dams in 2015 to 43 dams in 2016, against the planned target of 49 dams (MBNP, 2017).

The function of public infrastructural development in the economic wellbeing of a nation's citizenry has been a subject of concern in financial writing. The advancement of the cutting-edge country to its maximum capacity can never be accomplished without satisfactory public foundation speculation achieved through improved venture spending (Okolo *et al*., 2018). A large part of the discussion on ways of prodding development, decreasing neediness, and accomplishing other sustainable development goals (SDGs) is focused on the need to advance a huge development of public infrastructure (World Economic Forum, 2017). The standard convention for a critical expansion in government spending on the infrastructure is that it has a strong development advancing impact through the efficiency of private sources and pace of return on capital, essentially when stocks are moderately low (Barro, 1990). In each economy, public use plays a functioning part in lessening local differences, creating social overheads and development of infrastructure such as transport, power, water-saving, and correspondence offices, development of capital merchandise businesses, essential and basic enterprises, innovative work (Development Bank of Southern Africa (DBSA), 2006; Dependra, 2007).

Nevertheless, public expenditure on infrastructure invigorates the development cycle of the economy, and the channel through which this shows relies essentially upon the exact structure and size of consumption allotted to monetary and social advancement projects (Dickey and Fuller, 1979). Infrastructural improvement cuts across practically all areas of the economy, as it has to do with the prosperity of the general public and government assistance, which are identified with wellbeing, schooling, sport, climate, the travel industry, and formative offices for youth and ladies. For example, it was assessed by World Economic Forum that each dollar spent on capital activities utilities, energy, transport, waste management, flood, security, and telecommunications create a return on investment of 5 to 25 percent. Ghate, Glomm, and Streeter (2016) noted that when public expenditure is incurred in investments or re-allocation of investible resources to the private sector, the effect is basically channeling resources from less to more desirable productive lines of investment. Such a category of expenditure is also noticeable in public-private spending on education, health, transport, communication, water disposal, electricity, water, and sanitation which can also accentuate the growth process (Ghate, Glomm & Streeter, 2016).

Olela and Wanyonyi (2018) explained that government and civil society organizations had implemented many projects worth millions of investments but still faced sustainability challenges over a period; Governments and water sector stakeholders have worked hard to ensure improvement in institutional capacities, through policies and guiding frameworks for sustainable service delivery. They further suggested the need to move beyond infrastructure development to ensure water service providers receive capacity building focusing on governance, technical capacity, and equipped information. It has become a challenge to finance rural water supply projects since such projects cannot recover costs, capital maintenance, cost of operations, and maintenance, yet they collect revenues from the sale of water. Rural schemes may require cost recovery in this line of thought. The government is usually called to fix broken parts or replace infrastructure without considering the Life Cost Cycle approach (World Bank, 2017). According to Montgomery, Bartaram, and Elimelech (2009), there are three factors to consider when planning for

sustainability of water projects, which include effective societal demand, cost recovery, local financing, and dynamic operation and maintenance: Effective community demand is achieved through participation and involvement in planning. However, this has faced challenges such as limited incentives, choice of technology, and limited awareness. Local financing and cost recovery are linked to local borrowing and savings, community-based subsidies lack transparency and accountability. Dynamic operations and maintenance were identified to face challenges, such as isolation of rural communities and unmotivated local technicians who are not well incentivized (Montgomery *et al*., 2009).

In Nigeria, water supply development is a three-tier responsibility between the Federal, State, and Local Governments. Thus, water supply is often a key campaign issue for politicians (African Development Bank (AfDB), 2014). Conversely, Nigeria is endowed with adequate water resources. The total capacity of existing dams is about 51 billion m^3. The total renewable water resources of the country were equivalent to 1,893 m^3

per capita in 2008 (AfDB, 2014). About 47 percent of the water storage capacity in active use is accounted for by single-purpose hydropower dams, with multipurpose dams accounting for a further 41 percent of capacity in use. In comparison, single-purpose irrigation and water supply dams account for the remaining 12 percent of functional capacity (AfDB, 2014).

Furthermore, the national policy focuses on water supply and neglects sanitation. In 2003, a "Presidential Water Initiative (PWI): Water for People, Water for Life" was launched by then-President Olusegun Obasanjo; the initiative had ambitious targets to increase access to potable water, including a 100 percent water access target in state capitals, 75 percent access in other urban areas, and 66 percent access in rural areas (Idu, 2015). Little has been done to implement the initiative, and targets were not met, whereas, in 2011, the government voted in the United Nations to make water and sanitation a human right.

The current infrastructure deficit in Nigeria has been identified as the major constraint towards achieving the nation's vision of becoming one of the 20 largest economies by 2020 (Sanusi, 2012). The provision of economic infrastructure can expand the economy's productive capacity by increasing the quality and quantity of such infrastructure. Nigeria is replete with several cases of inadequate infrastructure, which include the irregular supply of electricity, shortage of piped water, fuel scarcity, and bad roads. The current state of infrastructural facilities has had a very negative impact on the manufacturing sector Among such impacts are low production of goods and services due to irregular supply of electricity, sound water systems, and bad roads. A flawed communication system equally contributes to depleted economic growth and development. It has led to some manufacturing industries winding up, relocating to other countries or regions, and hindering foreign investors from investing in the economy (Sanusi, 2012).

Nigeria did not meet the MDG target of halving the population in 2015 without adequate access to improved drinking water sources (Idu, 2015). Nigeria ranks behind many other sub-Saharan African countries such as Ghana, Rwanda, Botswana, and Sierra Leone in access to potable water (Marks *et al*., 2013). This is reflected because a significant proportion of the Nigerian rural population uses rivers, ponds, lakes, and harvested rain as their primary water supply sources (Baba-Adamu & Jajere, 2020).

3. METHODOLOGY

Data for objectives one and two were sourced through secondary means of data collection involving the use of existing online records from the CBN, NBS, and MBNP. The Augmented Dickey-Fuller Test (ADF) was used to statistically determine the existence of unit roots among the data or otherwise in order to provide information about the data being stationary or non-stationary. The existence of unit roots makes hypothesis test results unreliable and inaccurate (Abubakar *et al.*, 2018; Oladinrin *et al.*, 2012; Dickey and Fuller, 1979). If the p-value from the test is less than some significance level (e. g. $\alpha = .05$), then we can reject the null hypothesis and conclude that the time series is stationary.

The data provide time-series information on government expenditure on water and power and the contribution of the construction industry to national GDP from 1999 to 2019. Spyder software, version 3.7.3 was used to carry out descriptive and inferential statistical analysis on an IDE platform The captured data, which is presented in Tables 2 and 3, were used for trend analysis to spot patterns, and predict future trends of the contribution of the Nigerian construction industry to GDP concerning government expenditure on utility. Graphical representation of the behaviour of the data portrayed the trend of government investment in utility development and the performance of the construction industry in Nigeria in terms of its contributions to GDP and the country's economic growth at large.

Furthermore, the study set out to test the hypothesis that there is no significant impact of government investment in utility on the construction industry's contribution to GDP. In determining if a statistically significant relationship exists between government investment in utility development and the contribution to GDP of the construction industry, the researcher employed the regression analysis between capital expenditure on power and water, and construction industry contribution to GDP. This was done to determine the existence of the impact of government expenditure on utility development and the construction industry's performance to GDP by its contribution to GDP. The rule guiding the outcome of this test is that if the p-value is less than or equal to 0.05, the alternative hypothesis (H_1) is accepted and the null hypothesis (H_o) is rejected. Therefore, the conclusion is drawn that there is a significant relationship between government investment in unity development and the contribution to the GDP of the construction industry.

4. PRESENTATION AND DISCUSSION OF RESULTS

4.1. Result of Augmented Dickey-Fuller Test

Secondary data collected for the study are presented and analysed according to the objectives of the study. The unit root test was conducted on the data before using them for forecasting purposes. The results of the ADF test revealed that the data were non-stationary at normal level. Therefore, to achieve stationarity, the unit root test was conducted at the first difference level for both power (P) and water (W), up to the second difference level for construction industry contribution to GDP (CICGDP). The result, as presented in Table 1, led to the rejection of the null hypothesis, which denotes that the data in all cases are stationary. This implies that the data is clean and fit for forecasting purposes. This is important because it makes the interpretations of the analyses valid and reliable.

Table 1: Result of ADF Unit roots test

	Levels		1st Difference		2nd Difference		
Variable	Intercept	Trend + Intercept		Trend + Intercept		Trend + Intercept	Conclusion

POWER	-2.499263	-1.793715	4.690948***	-5.461698***		I(1)
WATER	3.971128***	-0.140834		-3.997248**		I(1)
CICGDP	0.227848	-2.748757	-1.800007	-1.253286	4.425937***	I(2)

Notes: *** indicates significance at 1% level; ** indicates significance at 5% level The values in bracket [ ] for the ADF test show the optimal lag length selected by the SIC within a maximum lag of 9. Variables are in log forms.

4.2. Level of Government's Investment in Utilities Between 1999 and 2019

In determining the level of government investment in the development of utilities between the years 1999 and 2019, the government's capital expenditure on power and water was obtained and is as shown in Table 2.

Table 2: Capital Expenditure of Power and Water

Year	Capital Expenditure on Power (₦'billion)	Capital Expenditure on Water (₦'billion)
1999	3.27	13.19
2000	3.38	13.92
2001	41.07	14.47
2002	47.29	15.79
2003	56.52	17.39
2004	67.91	19.66
2005	74.27	22.16
2006	109.05	24.54
2007	116.63	29.29
2008	134.19	33.70
2009	158.66	37.92
2010	179.47	42.79
2011	275.85	45.26
2012	375.84	47.81
2013	492.68	70.59
2014	531.95	90.04
2015	536.67	105.87
2016	524.68	137.15
2017	667.92	163.75
2018	871.55	211.52
2019	1,037.77	294.53

Source: *CBN Statistical bulletin 2020.*

Table 2 shows a continuous increase in government expenditure on power and water. However, it also shows that as of 2016, government expenditure on power was ₦524.68 billion against the previous year's expenditure of ₦536.67 billion in 2015. The data presented in Table 2 suggest that the government is constantly improving its annual budget to provide both power and water for the citizenry. This report is graphically captured in Figures 1 and 2.

Figure 1 presents both the line plot and graphical presentation of capital expenditure on power obtained. Additionally, Figure 1 offers the prediction graph forecasting the future behaviour of capital expenditure of power up to the year 2025. The graphical presentation shows an upward movement which indicates a continuous increase in government expenditure on power. Figure 2 shows an upward movement of capital expenditure on water in Nigeria up to the year 2025. This suggests that the government expenditure on the

development of the power sector, which is a typical expenditure on utility, is on the increase annually.

Similarly, Figure 2 portrays the line plot of capital expenditure on water in Nigeria. The plot shows an upward movement of capital expenditure on water, indicating a continuous increase in government expenditure on water.

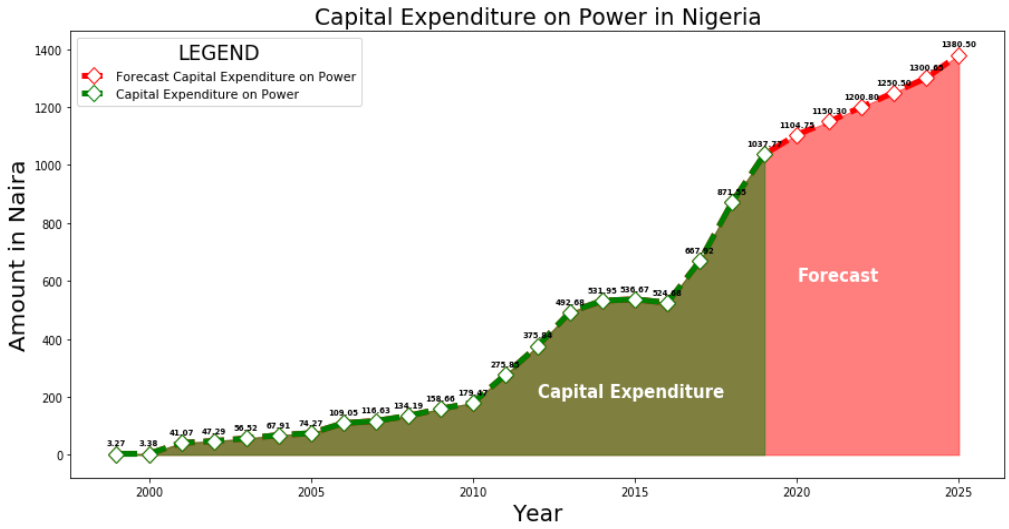

Figure 1: The Predicted Graph of Capital Expenditure on Power

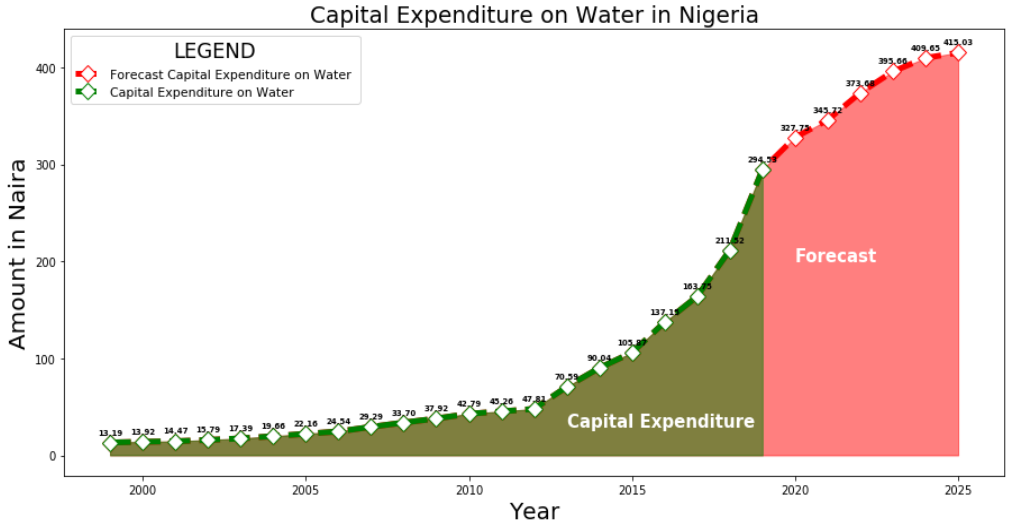

Figure 2: The Predicted Graph of Capital Expenditure on Water

Figure 2 equally shows the prediction graph forecasting the future behaviour of capital expenditure on water up to the year 2025. Figure 2 shows an upward movement of capital expenditure on water in Nigeria up to the year 2025. This movement suggests that the government expenditure on the provision of water is on the increase annually. The forecasted increment, notwithstanding, is based on other factors impacting the contribution remaining constant.

4.3. Level of Performance of Construction Industry from 1999 to 2019

To evaluate the construction industry's level of performance in its contributions to economic growth from the year 1999 to 2019, the contributions of the construction industry to GDP from the year 1999 to 2019 were obtained from CBN statistical bulletin (2020) as presented in Table 3.

Table 3: Contribution of Construction Industry to GDP

Year	CI Contribution to GDP (₦'billion)	Total GDP (₦'billion)	CI Contribution to Total GDP (%)
1999	109.57	5,307.36	2.06
2000	121.82	6,897.48	1.77
2001	162.18	8,134.14	1.99
2002	191.01	11,332.25	1.69
2003	234.47	13,301.56	1.76
2004	311.85	17,321.30	1.80
2005	414.76	22,269.98	1.86
2006	551.63	28,662.47	1.92
2007	733.67	32,995.38	2.22
2008	975.78	39,157.88	2.49
2009	1,297.79	44,285.56	2.93
2010	1,570.97	54,612.26	2.88
2011	1,905.57	62,980.40	3.03
2012	2,188.72	71,713.94	3.05
2013	2,676.28	80,092.56	3.34
2014	3,188.82	89,043.62	3.58
2015	3,472.26	94,144.96	3.69
2016	3,606.56	101,489.49	3.55
2017	4,281.78	113,711.63	3.77
2018	6,031.06	127,736.83	4.72
2019	8,996.90	144,210.49	6.24

CI = Construction Industry
Source: CBN Statistical Bulletin (2020)

Table 3 shows the contribution of the construction industry to GDP within the years under review. It is appreciating to note that the contribution of the construction industry to GDP from the year 2000 to 2019 increased continuously. The construction industry's contribution to the GDP was further captured graphically in Figure 3. Figure 3 combines the line plot of the construction industry's contribution to GDP within the period under review and the projection of what to expect in the nearest future, provided other factors impacting such performance remain constant. The Figure 3 shows an upward movement in the contribution of the construction industry which suggests that the construction industry's performance is on the increase.

Table 2 and Figure 3 are in line with the view of NBS (2019) that the construction sector has grown over the years as a result of demands for real estate and housing. The provision of infrastructure to support an increasing population size, and the need to open

up communities to foster inter-state and inter-regional trade and movement have seen the active involvement of all stakeholders secure the success witnessed in the industry (NBS, 2015). Figure 3 also pictures future forecasts of the construction industry's contribution to GDP up to the year 2025. The result corroborates Isa *et al*., (2013)'s findings, which found a link between economic growth and the construction industry in both developed and emerging countries like Nigeria, with signs of future expansion.

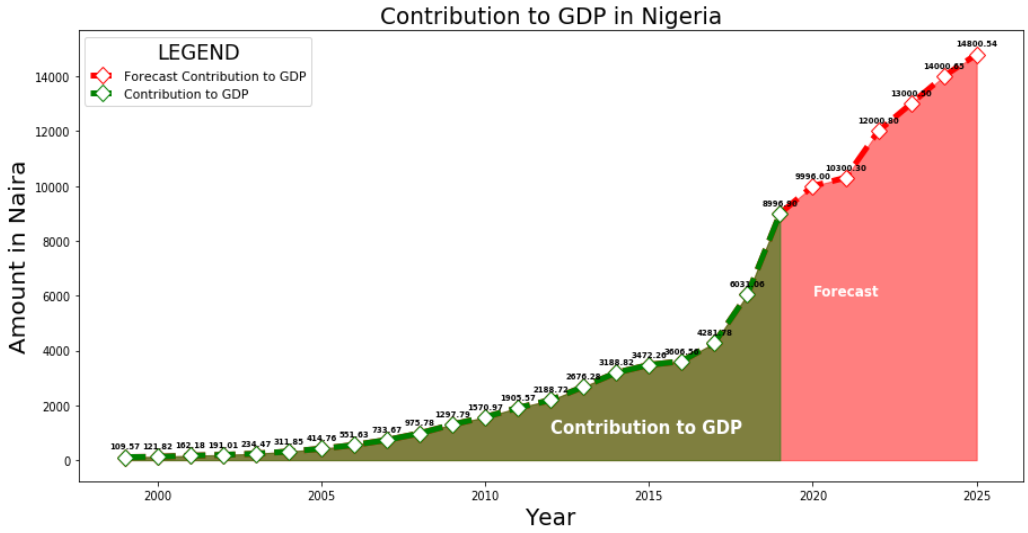

Figure 3: Predicted Graph Construction Industry's Contribution to GDP in Nigeria

4.4. Impact of Government's Investment in Utilities on Construction Industry's Performance

The hypothesis tests if government investment in utility [the capital expenditure on power (GEOP), and the capital expenditure on water (GEOW)] development carries a significant impact on the construction industry's contribution to GDP (CICGDP) in Nigeria. The dependent variable (CICGDP) was regressed on predicting variables (GEOP and GEOW) to test hypothesis H_0. The result revealed that GEOP and GEOW significantly predicted CICGDP, $F(2, 18) = 624.449$, $p < 0.001$, which indicates that GEOP and GEOW can play significant roles in shaping CICGDP. Table 4 shows the summary of the findings. The R^2 value indicates that about 98.6% of the variation in the CICGDP can be accounted for by government capital expenditure on power and water.

Table 4: Result of Impact of GEOP and GEOW on CICGDP

Variable	Beta Coefficient	R^2	F	t-value	p-value	Hypothesis Supported?
Constant	-135.029	0.986	624.449	-1.498	0.051	No (Rejected)
GEOP	3.244			4.257	0.000	
GEOW	17.503			5.742	0.000	

The heatmap of the individual impact of capital expenditure on power and water, and construction industry contribution to GDP is significant as presented in Figure 4. The matrix shows the individual R^2 between government capital expenditure for power and water and construction contribution to GDP. From the matrix, the regression coefficient

between capital expenditure on power and construction contribution to GDP is 0.98 while that of capital expenditure on water and power is 0.99. From the key on the right-hand side of the matrix the values where the weighted correlation coefficient falls between 0 and 1 inclusively instead of 0 to 100%. The least value in the matrix is 0.96 while the highest is 1 which indicates a strong relationship, as shown in the main diagonal and other pairs. Therefore, the null hypothesis is rejected and it was concluded that the impact of the government's investment in the development of utilities between 1999 and 2019 on the construction industry's performance within the years under review is significant.

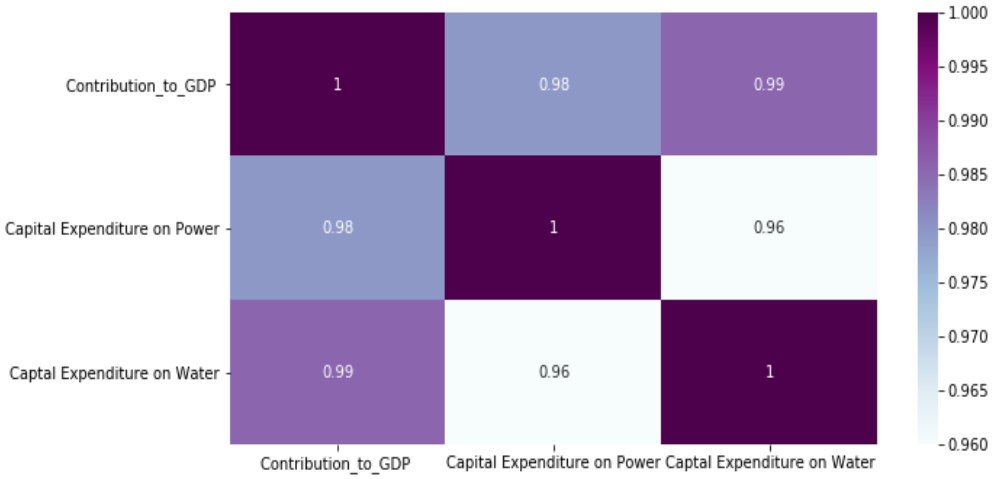

Figure 4: The Heatmap of the Individual Impact of Power and Water on CICGDP.

5. Conclusion and Recommendations

The interdependency of the government's investment in the utility and construction industry's contribution to GDP was revealed by the study. There is an improved contribution from the construction industry when government invests more in utility development. The upward movement of government expenditure on the provision of power and water showed an increase annually and offered prediction graphs forecasting future behaviour of capital expenditure up to the year 2025. The results equally showed that the contribution of the construction industry to GDP from the year 2000 to 2019 increased continuously. It was concluded that the impact of the government's investment in the development of utilities between 1999 and 2019 on the construction industry's contribution to GDP within the years under review was significant. This study recommends an improved government investment in utility development by increasing its capital expenditure in the power and water sectors since it improves the construction industry's contribution to GDP, and by implication, its performance.

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