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Empirical National Power Development Planning: The Crux for Improving Nigeria's Power Generation Output

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ABSTRACT

Development is crucial to the sustenance and growth of any nation. Since independence, Nigeria has embarked on series of National Development plans and visions in her endless efforts to search for appropriate development strategies. It is worrying that these development plans and visions have failed to achieve their expected objectives. This is obvious from the widespread poverty, derelict infrastructure, immense unemployment, high incidence of diseases and excessive debt burden among others bedevilling the country. Nigeria in the last fifty years has been combatting the problems of development in spite of huge human, material and natural resources in her possession. This paper discusses the problems affecting National Development Planning in Nigeria. The paper also proposes the adoption of empirical formulae and models for National Development planning especially in the area of electricity production for sustainable socio-economic development. The paper concluded that faithful implementation and commitment of our leaders on the policies developed from empirical planning and are vital for the achievement of sustainable development in Nigeria.

Keywords: Development, independence, unemployment, electricity, poverty

INTRODUCTION

Electricity production in Nigeria dates back to 1896 when it was first produced in Lagos with a total generating capacity of 60 kW. This was because at that time, the maximum demand was less than 60 kW [1]. Electricity supply in Nigeria was at the time managed by Public Works Department (PWD) in 1946, after which a central body called the Electricity Corporation of Nigeria (ECN) was constituted in 1950 to take care of electricity supply and development. Subsequently, other bodies like Native Authorities and the Nigerian Electricity Supply Company (NESCO) were given licenses to produce electricity in some locations in Nigeria [1]. The Niger Dams Authority (NDA) was later formed by an act of parliament, with the responsibility for the construction and maintenance of dams and other works on the River Niger and elsewhere, for the sole purpose of generating electricity by means of water power, improving navigation, promoting fish brines and irrigation [1]. The operations

of ECN and NDA were subsequently merged to form a new organization known as the National Electric Power Authority (NEPA) in April 1972 [1]. However, as a result of unbundling and the power reform process, NEPA was renamed Power holding Company of Nigeria (PHCN) in 2005 by the former President Olusegun Obasanjo who signed the Power Sector Reform Bill into law to enable private companies participate in electricity generation, transmission, and distribution. The government then separated PHCN into eleven distribution firms, six generating companies, and a transmission company, all of which have been privatized [2]. It is worthy of note that the Nigerian Vision (NV) 20:2020 strategic objective is to ensure that the power sector is able to efficiently deliver sustainable, adequate, qualitative, reliable and affordable power in a deregulated market. The Vision estimates that Nigeria would need to generate about 35,000MW of electricity by 2020 [2]. The target should be to grow installed power generation capacity from 6,000MW in 2009 to 20,000MW by 2015 and 35,000MW by 2020. In the medium-term, existing IPPs will be encouraged to increase capacity and ongoing NIPP projects will be speeded up to achieve the target of 20,000MW by 2015 [2].

There is no gain saying the fact, that the successes of every nation depend on its vision of an ideal state, hence, the need to set targets and reference points against which short term actions and achievements could be weighed. It is on this note that rapid socio-economic development in any nation is dependent on their national development planning policies. Nigeria had embarked on series of development plans to hasten her rate of socio-economic growth. Nigeria has had a relatively long experience in development planning starting with the Colonial Development Plan from 1958 to 1968. Fixed medium-term development plans and National Rolling Plans were also developed and executed with mixed results. Other premeditated efforts such as the Structural Adjustment Programme (SAP), National Economic Empowerment and Development Strategy (NEEDS), the strategy for attaining the Millennium Development Goals (MDGs) and the 7-Point Agenda were not effectively implemented, and consequently, recorded modest success [2].

Nigeria has had series of development plans. Her forty-nine years of independence actually are rolling by daily in search of development. She seems to be the only country where practically all notions and models of development have been experimented [3]. [4], also affirmed that the first National Development Plan policy was formulated between 1962 and 1968, two years after independence with the intentions of developing opportunities in health, education and employment and improving access to these opportunities. However, the failure of this plan was as a result of the collapse

of the first republic and commencement of the civil war in addition to the fact that fifty percent of resources necessary to finance the plan was to emanate from external sources but only fourteen percent of the external finance was received [4]. The post-civil war in 1970 advanced the second national development plan from 1970 to 1974, which prioritized agriculture, industry, transport, manpower, defence, electricity, communication and water supply and provision of social services [4]. The third plan, covering the period of 1975 to 1980 was deemed more ambitious than the second plan. Emphasis was placed on rural development and efforts to revamp agricultural sector. The fourth plan 1981 to 1985 recognized the role of social services and health services which was aimed at bringing about improvement in the living conditions of the people. The specific objectives were: an increase in the real income of the average citizen, more even distribution of income among individuals and socio-economic groups, increased dependence on the country's material and human resources, a reduction in the level of unemployment and underemployment [4]. This paper discusses national development in Nigeria. It examines the problems of national development in Nigeria, and proposes the need for empirical model planning for national power development, since adequate power production is an instrument for sustainable socio-economic and national development.

Nigeria's National Development Plans

According to [4], Nigeria has gone through four national development plans in her post-independence history, of which, the fifth National Development Plan never materialized. The national development plans included: the First National Development Plan in 1962, the Second National Development Plan from 1970-74, the Third National Development Plan from 1975-80 and the Fourth National Development Plan from 1981-85 [4]. Apart from the five year National Development Plans, the Federal Government has also embarked on three year rolling plans between 1990 and 1998 and long term perspective planning in her endless efforts to search for appropriate developmental strategy. The federal government introduced another ambitious programme between 2003 and 2007 known as the National Economic Empowerment and Development Strategy (NEEDS). It was a medium term planning which focused on wealth creation, employment generation, poverty reduction and value orientation. Recently Vision 20:2020 was launched. Vision 20:2020 is a perspective plan which aims to make Nigeria a fully developed economy by the year 2020. Though development planning has been a consistent phenomenon in Nigeria's administrative system, it is worrisome that these plans have not achieved the expected results.

This is evident from widespread poverty, dilapidated infrastructural facilities, massive unemployment, low capacity utilization, technological backwardness, short-life expectancy, urban congestion, excessive debt burden, environmental degradation and high incidence of diseases which beset the country. It is obvious that Nigeria is an underdeveloped country and occupies very low position among the poorest countries of the world in spite of her huge potential in natural and human resources. In the opinion of [5] "a review of the various plans clearly shows that the country is still very far from where it was envisaged it will be today. This is simply as a result of either faulty implementation of the plan, distortions or even non-implementation". [4] in his review observed that the line of the Third National Development Plan was to utilize resources from oil to develop the productive capacity of the economy and thereby permanently improve the standard of living of the people. Therefore, the plan was premised on the need for the public factor to provide facilities for the poorer sections of the population including electrification, water supplies, health services, urban housing and education.

Despite the series of development plans put in place by successive governments in the past, with its desired objectives for improved standard of living and positive national development, all efforts to engender significant progress have proved futile because a lot of factors have combined together to hamper the nation's development; the most probable of which is the fact that there is no executive capacity responsible for the formulation and implementation of these plans. Furthermore, some of the previous development plans failed since there was little or no consultation of the general public, as planning is supposed to involve even the peasants in the rural areas [3]. Lack of good governance which results to bad leadership is another factor militating against national development in the country, since most of our leaders have no sense of commitment to development. The high level of corruption and indiscipline is another barrier to national development as the Nigeria state is corrupt and managed by corrupt leaders who have made the state an instrument of capital accumulation, rather than the projection of fruitful socio-economic development. Finally, the mono-economic base of the country is another important factor hampering the nation's development, since the country is largely dependent on crude oil for her survival to the detriment of other national resources; the consequence is a non-diversified economy which is not suitable for a sustainable development [3].

Empirical Formula for Electricity Production Planning

According to [5], the Total Installed Capacity of the currently generating plants in Nigeria is 7,876 MW, but the Installed available Capacity is less than 4,000MW as at December 2009. They observed that seven of the fourteen generation stations are over 20 years old and the average daily power generation is below 2,700MW, which they inferred is far below the peak load forecast of 8,900MW for the currently existing infrastructure. The consequence is the massive load shedding experienced across the nation.

They identified the following challenges affecting the current status of power generation in Nigeria as:

a. Inadequate generation availability;
b. Inadequate and delayed maintenance of facilities;
c. Insufficient funding of power stations;
d. Obsolete equipment, tools, safety facilities and operational vehicles
e. Inadequate and obsolete communication equipment
f. Lack of exploration to tap all sources of energy form the available resources; and
g. Low staff morale. [5].

[5] also emphasized that electricity is important in the socio-economic and technological development of every nation. They observed that the electricity demand in Nigeria far surpasses the supply and the supply is irregular in nature and the country is faced with acute electricity problems, which has hindered its development despite the availability of her vast natural resources. It is on this backdrop that a strong correlation between socio-economic development and the availability of electricity could be established.

It is therefore pertinent to plan electricity production in any nation using available models or relations for sustainable development. The production of electricity per year could be deduced from the expression below:

$$E = E_0 e^{i(t - t_0)}$$

..... (3.1)

Where: E = Electricity Production Required (Mw)

E_0 = Electricity Production in the base year (Mw)

t = time for the production of electricity (Year)

t_0 = the base year (year)

i = Production rate per year (Yadav, 2004)

This paper shall now forecast the electricity production in Nigeria empirically using the equation (3.1) and obtain projected values for planned electricity production from 1999 to 2035, considering the fact that the tenure of each successive governments is a four years term. Table 1 shows the average electricity generated by successive governments within the

period of 1999 to 2019. It could be observed that electricity production increased from 3,723 MW in 1999 to about 7,000MW in 2019, even though the installed capacity at 1999 was about 6,000MW of electricity. The electricity production rate was very low as a result of the numerous challenges faced in the power sector within the reviewed period. However, the current government plans to raise the electricity production to about 10,000MW by the end of 2019 upon the successful completion of on-going power plants projects especially the Mambilla hydro project which is expected to produce 3050MW of electricity

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Table 1: Average Electricity Production from 1999 to 2019

S/NO	Average Electricity Production (MW)	Tenure Period (Years)
1.	3723	1999 – 2003
2.	4110	2003 – 2007
3.	4521	2007 – 2011
4.	4838	2011 – 2015
5.	6000	2015 - 2019
6.	7000	2019 - 2023

Source: IEA Statistics (2014)

According to [6], the electricity production in 1999 stood at 3723 MW as shown in table 1 and this will be the electricity production in the base year (E_0) with the electricity production rate per year assumed to be 10% for high growth rate. The planned electricity production within the period 1999 – 2035 is computed using the EXCEL software and the results indicated in table 2 were obtained.

Table 2: Electricity Production Planning from 1999 to 2035

Electricity Produced in Based year E_0 (MW)	Base Year t_0 (Yr)	Current Year t (Yr)	Required Electricity Production E (MW)
3723	1999	2003	5554
5554	2003	2007	8286
8286	2007	2011	12361
12361	2011	2015	18440
18440	2015	2019	27509
27509	2019	2023	41039
41039	2023	2027	61223
61223	2027	2031	91335
91335	2031	2035	136255

The graph of Electricity Production (MW) against Time (Year) is plotted from the results obtained in table 2 above and is displayed in figure 1 below:

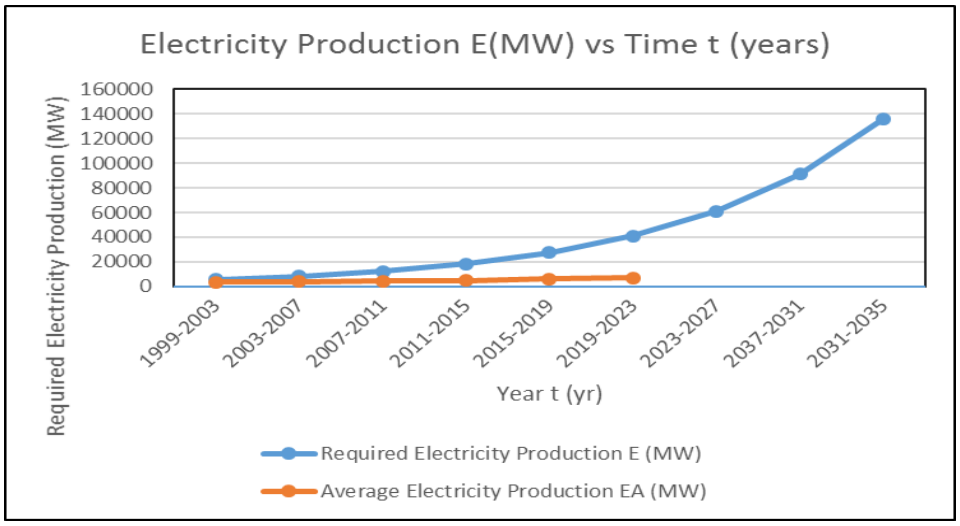

Figure 1: Graph showing Nigeria's Planned Electricity Production within the Period 1999-2035

Results and Discussions

Nigeria had witnessed series of military coups before 1999 when a democratic civilian government was elected; the usual national development plans of the previous governments were not successful and abandoned. The new government in 1999 under the leadership of former president Gen. Olusegun Obasanjo (rtd) realized the necessity for comprehensive socio-political and economic reform of the country since the previous plans did not put the Nigerian economy on sound footings and on this backdrop, the National Economic Empowerment and Development Strategy (NEEDS) that appeared to be a road map to address the development challenges in Nigeria was launched in 2003. The basic thrust of NEEDS focused on: empowerment, wealth creation, employment generation and poverty reduction as well as value reorientation [7]. This brought forth the idea of the power sector reforms for sufficient electricity production for rapid socio-economic development. It could be observed from table 1 that by employing empirical planning, Nigeria should have been generating 5,554MW of electricity within the period 1999-2003 and that by 2015, the country would have been generating 18,440MW of electricity compared to the 6,840 MW generated in that year and consequently by 2019, she could have been generating 27,509MW which is more than doubled the planned production of 10,000MW by the end of 2019 from the

current government of President Muhammadu Buhari (GCFR); this would have gone a long way in improving the power infrastructure in the country. Furthermore, projecting into the future, by 2027 the country could be producing as much as 61,223MW and 136,255 MW by 2035 which could have provided a robust system for the much needed sustainable development. It could be observed from figure 1 that the electricity production in MW obtained from the empirical model (or formulae) showed a steady geometric increase from the average electricity produced in the country [8]. The projections for higher electricity production is observed within 2023 to 2035 which is a good indicator for achieving the much needed sustainable national development goals. The significance of empirical planning in electricity production is that it allows the government a better assessment of the energy scenario in relation to the energy demand in the country which would then aid the successive governments in determining the types, nature, complexity, numbers and cost of the power plants to build within their tenure periods that would satisfy the planned energy requirements.

RECOMMENDATIONS

The following recommendations are now made to ensure sustainable socio-economic development through planned electricity production:

1. The National Planning Commission (NPC) saddled with the responsibility of proposing strategic development plans should establish a department solely for electricity production planning.
2. The empirical models (or formulae) and softwares available for electricity production planning should be employed by NPC for determining the required amount of electricity to be generated within specified periods and make appropriate projections for the government to implement.
3. The government should ensure prompt implementation and close monitoring of power plants installation proposed by the NPC, provide the necessary funding and ensure completion of such projects within their tenure period.
4. Power projects should be given utmost priority by successive governments and proposed power plants should be completed within the four years tenure of any government to forestall inheritance of uncompleted power projects by new governments after elections.
5. The government should provide incentives to new entrants in power plants construction, especially for renewable power generation, in order to achieve additional generation capacity.

6. The political leaders and top government bureaucrats in the country should be disciplined to ensure that all the objectives of our National Development Plans are achieved.

CONCLUSION

There is no doubt that the failure of National Development Plans in Nigeria has resulted in acute unemployment, widespread poverty, illiteracy, decayed social and physical infrastructure, technological backwardness, urban congestion, excessive debt burden, poor growth of agricultural production and high incidence of diseases. Therefore, it is necessary to address all the problems that hinders national transformation by proposing and implementing strategic National Development Plans. The strategic objective of Nigeria's Vision 20:2020 is to ensure that the power sector should be able to efficiently deliver sustainable, adequate, qualitative, reliable and affordable power in a deregulated market. The Vision reckons that Nigeria would need to install power generating infrastructure that would increase electricity production from 6,000MW in 2009 to 20,000MW by 2015 and 35,000MW by 2020. The Vision relies heavily on the private sector to take the lead in power generation. Therefore empirical models should be adopted for power development planning in Nigeria and the implementation of the proposed methods would enhance the value of our development plans and ensure that they are practicable instruments of sustainable development in Nigeria

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