CENTRAL BANK OF NIGERIA

INFRASTRUCTURE EXPENDITURE POLICY AND PRIVATE SECTOR OUTPUT IN NIGERIA 1970 - 1998

A STUDY BY:
THE RESEARCH DEPARTMENT AND
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STUDY TEAM

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CONTENT

LIST OF TABLES

PREFACE

Infrastructure expenditure policy is crucial in assessing the state of infrastructure in any economy. In Nigeria, the provision of public services is at a crossroad as it currently suffers from abject neglect due, primarily, to poor funding as well as conflicting funding priorities. In the light of the high degree of urbanisation that had outstripped the growth of infrastructure, the need for substantial public investment in infrastructure cannot be over-emphasised.

In Nigeria the provision of almost all types of infrastructure such as electricity, communication, transport, water, etc., has been the responsibility of government. The immediate effect of this policy had been the non-market-pricing regime for the services of these sectors. The current monopoly has also given rise to inefficiency in the sector. The growing inefficiency of most of these sectors has a lot of implications for the growth of the private sector and its output. This is because most of them rely on the services of these. sectors. For instance, electricity and water to power their plants and keep production running smoothly, among others. Several studies, including The World Bank, had revealed that the poor physical condition of infrastructure in Nigeria added about 10 to 25 % to the total machinery and equipment budgets of firms. This increase in budgetary cost translates to high transaction cost and hence high prices for the product from these firms. This among other reasons has been responsible for the growing call for a reduction in the size of the public sector and in particular the privatisation of government owned enterprises, especially the utilities sector.

This study situates the problem of infrastructure in Nigeria from two broad perspectives. First, the investment in infrastructure and the priorities of funding as we move into the new millennium. Second, the impact of public physical capital on private sector output. While not inferring that this study has answered all the questions concerning infrastructure provision, it has however added to the

plethora of information on the state of infrastructure in Nigeria as well as suggest options that would help in addressing some of the findings emanating from this study. It is our hope that this study would be of immense use to policy makers and politicians in this new democratic dispensation.

Study Team
November 20, 1999

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Study Team
November 20, 1999

EXECUTIVE SUMMARY

The observed neglect, arising from poor funding for maintenance, which led to decay of infrastructure in Nigeria with serious implication for private sector productivity motivated this study. There was therefore a compelling need to examine infrastructure expenditure policy in the last two decades (1970-1998) with a view to making recommendations as we move into the new millennium.

The Problem

In Nigeria, as in most developing countries of sub-Saharan Africa, urbanisation and infrastructural development are closely and inversely related. While the degree of urbanisation had been on the increase, due mainly to economic opportunities that the urban centers presents which are grossly inadequate in the rural areas, the stock of infrastructure had been declining in almost every sector of the economy. The financing of almost all types of infrastructure has been the responsibility of the central government right from independence. Thus, during the oil boom of the 1970's there was rapid expansion in infrastructure such as electricity, communication, transport, water, to mention a few.

The arrangement for the delivery of infrastructural services created institutions which were monopolistic in nature and coupled with the huge subventions they enjoyed from government, their operations were devoid of the lure for profit. This led to:

- Non-market pricing regimes for the services they provide;
- Inefficiency in service delivery; and
- Gigantic and obselete technology of the physical infrastructure.

Subsequent to the unfavourable international oil market conditions, the revenue from oil, the major source of National Income, declined sharply and it became difficult to maintain existing infrastructure leading to deterioration. As a result of this development, the private industrial sector had to rely on its own stock of infrastructure. The immediate implication of this situation was the addition to cost of total machinery and equipment budget of firms thus leading to:

- High transaction cost;
- High prices for the product of the firms; and
- Declining output.

No doubt, the growing concern about the poor state of infrastructure had been responsible for the call for the disengagement of government from rendering services the private sector could adequately provide and a drastic reduction in the size of government.

To put these problems into perspective the issue of infrastructure is addressed from two standpoints:

- an appraisal of governments investment in infrastructure in the last two decades and the funding priorities in the same period; and
- the sufficiency and impact of public sector expenditure on infrastructure on private sector efficiency and growth in output using standard measures.

Conceptual and Theoretical Issues

Conceptually, the provision of adequate infrastructure enhances the development process by:

- increasing production of goods and services in an economy;
- promoting efficiency in service delivery;
- reducing the risk of health hazards;
- reducing production costs and the final price of products;
- reducing transaction costs;
- reducing poverty;
- contributing to environmental sustainability;
- raising systemic productivity;
- enhancing international competitiveness;
- attracting Foreign Direct Investment (FDI); and
- stimulating economic activity.

Since, theoretically, building stock of infrastructure may not in itself overcome unskilled labour force, inadequate raw materials, or long distance to markets, the need to properly articulate policy on spending priorities is underscored. And, since the conceptual linkage

between infrastructure investment and private sector output is also an empirical issue an econometric model is developed in this study to answer some unavoidable questions that may arise.

Broad Policy Objectives

Government policy with respect to the infrastructure, considered in this study, are:

- **Transport:** To ensure that road, rail, air, and water transport services are organised in such a way as to allow for fair competition between the various modes. The creation and expansion of indigenous capability to enhance the maintenance of existing facilities and implementation of approved programmes.
- **Communication:** The provision and maintenance of adequate communication services with emphasis on speed, reliability and efficiency in the utilisation of installed telecommunication and postal facilities. To ensure that the communication infrastructure is so reorganised as to respond to market forces and be managed in a business-like basis.
- **Electricity:** To develop and maintain an efficient, coordinated and economical system of electricity supply for all parts of the country and to provide adequate, regular and uninterrupted power supply.
- **Water:** The provision of access to safe and reliable drinking water for a large section of the population.

In what follows, methodological framework is developed to examine and appraise government's stated policies with respect to infrastructure investment and its implication for private sector productivity.

Methodology

Apart form the use of secondary data to appraise the state of infrastructure and expenditure policy in Nigeria, two other methodological framework were employed in this study. First, a survey was conducted, of 104 large private economic sectors including

manufacturing, building and construction, services, and transport sub-sectors, using the Federal Office of Statistics (FOS) frame of industrial establishments. A total of six industrial towns (Lagos, Ibadan, Port Harcourt, Aba, Kano, and Kaduna) were purposively selected for coverage. The survey responses were analysed to obtain information as to the adequacy of infrastructure, the output, cost and labour structure of these establishments as well as their factor intensity and productivity.

The second framework was the development of an econometric model to determine, empirically, the impact of infrastructure investment on private sector output. The model was specified in log form and followed a simple aggregate cost function associated with the Cobb-Douglas production function. The degree of responsiveness of cost of production as a result of incremental changes in sectoral output, factor price, stock of infrastructure. and technical change would be assessed from this model.

Major Findings

The findings from this study can be categorised into three, namely, findings from secondary data, sample survey, and empirical model.

Secondary Data

- The condition of both road and water transport system was observed to respond to the economic conditions of the country. Thus, a downturn in the economy also led to a downturn in the progress made in the road and water transport systems. The railway system had improved in recent years, starting from 1997 as seen by increases in the number of passengers and tonnage of goods carried. Also, air transport services had enjoyed a remarkable improvement in terms of organisation with the granting of license to private operators. However, the national carrier was still plagued with managerial as well as financial problems.

- Data showed that Nigeria was under-served with communication facilities such as telecommunication and postal services. This situation had been due to scarcity of technical staff, sub-standard equipment, poor maintenance of existing equipment and poor management of the institutions concerned with the provision of this service.
- Power interruptions were frequent and erratic leading to economic losses and compelling the private sector to purchase their own power generating equipments. On the whole the supply of electricity had been inadequate to cope with the growing demand for residential, industrial and commercial consumption.
- Although budgetary allocation for the provision of portable water increased in the past five years, many communities, especially in the rural areas were yet to have access to safe water. Further, persistent shortage of supply of portable water in the major urban centers was observed.

ii. Survey Findings

- Analysis of survey responses revealed low and declining stock of physical capital. Respondents were unanimous with respect to inadequate stock of electricity, transport, communication and water infrastructure.
- Several ways to improve the state of infrastructure were suggested by firms to include funding, maintenance and privatisation, amongst others.
- The deplorable state of physical infrastructure, the study revealed, had adverse effect on the output of the establishments surveyed. Increase expenditure on own infrastructure in the last five years had increased the cost of production for all firms.
- Analyses of the effect of declining stock of physical infrastructure on factor productivity and intensity of establishments showed low production capabilities which is an indication of production and allocative inefficiency. This was as a result of shifts in the cost

structure of the establishments that had made it difficult for them to afford best-practice utilisation of factors of production.

iii. Empirical Model

- A simple econometric model to investigate the impact of infrastructure on private sector output showed that there was significant negative relationship between cost of production and sectoral output.
- Variables such as interest rate and disembodied technical change were significant in explaining the cost structure for industry. However, the target variable, stock of infrastructure was not properly signed in our model even though it was highly significant.
- The overall impact of infrastructure on output was underlined in this model. For Nigeria, however, low utilisation of public infrastructure by our establishments could be responsible for the positive relationship observed between stock of infrastructure and cost of production.

Economic Implication of Results

The empirical results above support the fact that infrastructure expenditure growing ahead of productive activities would stimulate economic growth. It has further established that infrastructure is positively related to growth in output of establishments. This holds true for all types of infrastructure considered. The established relationship also suggests that the development of infrastructure would lead to growth.

The results also indicates that although infrastructure plays a crucial role in stimulating productive activities, the presence of complementary variables like input of capital are crucial. The inadequacies, with respect to provision of infrastructure, reported in this study was a clear reflection of the state of production in the economy.

Policy Concerns

The period 1970-1998 was characterized by inefficiencies, deficiencies and shortages in infrastructure in all sectors of the economy. The dismal status of infrastructure was due to poor investment allocation, which was a far cry from what was required to satisfy the demands in the economy.

In what follows, attempt is made to explore the policy concerns in the light of empirical and other evidences.

- There is the need to charge users economic price for services. An effective economic pricing regime promotes efficiency of an enterprise and ensures that adequate funds are available for maintenance.
- Despite the apparent scarcity of resources in the country now, there is considerable potential for mobilising capital for financing private sector infrastructure projects from domestic sources. However, the essential pre-conditions with regards to macroeconomic stability and efficiency of financial intermediaries would have to be met before significant progress can be expected.
- Participation in infrastructure construction, management and maintenance by the local community constitutes a major component of a successful infrastructure policy. Projects that are planned and executed from the central authority, without inputs from local beneficiaries often have a higher probability of failure and are usually not well maintained.
- The legal framework for commercial infrastructure should be put in place. This should aim at protecting property rights as well as promoting investor's confidence and thus willingness to invest. Individual property rights should be clearly defined and laws enforcing them should be fashioned in such a way that it would be fair and clear.

- The empirical evidences clearly points to the need for privatisation. The modalities for private participation in infrastructure include among other, management contract, leasing, investment concessions, build-operate transfer, de-monopolisation, and new entry and divestiture. These modalities of private sector participation are well suited to the infrastructure sectors with monopolistic characteristics, where full divestiture is either not tenable or not desirable.

1.0 INTRODUCTION

1.1 Background

Development economist underscored the need to build up infrastructure as a key stimulus to development. It has been assented that an analysis of infrastructure is invariably a part of the study of economic development (Ukpong, 1980).

The term infrastructure is used for many facilities generally referred to as economic and social overhead capital. Adeyemo (1979) sees physical infrastructure as the totality of basic physical facilities upon which all other economic activities in the system significantly depend. Infrastructure could then be broadly defined to include funding and facilities for education, roads, water supply and treatment systems, energy, postal and telecommunication systems, urban mass transit systems, judiciary and hospitals, etc.

Literature addresses the definitional issues in infrastructure from two broad perspectives. The first is rooted in the economically sensible large capital intensive natural monopolies, while the second, which is expedient in applied work, is based on a narrow definition of just the tangible stock owned by the public sector. The literature also notes that like other public goods, some benefits of infrastructure capital such as improved health, and a cleaner environment are magnitudes that are difficult to measure and thus are not included in official measures of national output. However, a strand of the literature views infrastructure from its impact on productivity and imposes a Cobb Douglas functional form to estimate this impact with the influence of public capital explicitly modeled.

Because investment in infrastructures are usually characterised by a sizeable initial lump sums of capital and indivisibility and because of the externalities they generate, government are generally responsible for providing such facilities, often at subsidised rate or free of charge to the Directly Productive Activities (DPA) that use them. Besides, it has been agreed that whenever there is a divergence between the private and social benefits or costs of an economic undertaking, there is a prima-fade case for government intervention (Gill, 1973).

In Nigeria, the ownership and investment in infrastructural facilities has been predominantly government i.e. federal, state and local government agencies. Recently, the Federal Government withdrew subsidy from gasoline with the intention of making funds available for development of the basic infrastructure in the country through the Petroleum Trust Fund (Special). Although the impact of such funding is not clearly evident, it is, however, clear that the development of the appropriate infrastructure would contribute to the economic development of the country.

1.2 Rationale for the Study

The massive migration of people from rural into urban areas is the most spectacular demographic upheaval that Africa has experienced in recent decades. The growth of Africa's cities has, therefore, outstripped local capacities of management, absorption, and financing, especially of public infrastructures.

The abundance of evidences on the poor state of infrastructure in Nigeria brings to fore the rationale for this study. In particular the physical condition of Nigeria's infrastructure, water supply, sanitation, roads, electricity, etc is generally poor. All types of infrastructure suffer from a massive backlog of neglected rehabilitation and maintenance, not to speak of investments needed to serve future growth. Periodic and routine maintenance, by far the most cost-effective types of infrastructure expenditure are almost nil. In effect, it has become more convenient to replace than to maintain while declining resources is making this even less and less feasible. As a result, deterioration is accelerating.

For instance most manufacturing and commercial establishments in Nigeria have been compelled by this worsening situation to have its own electricity generators. In the face of chronically unreliable public services, many also have acquired radio equipment for communications, vehicles to transport personnel and freight, and bore holes to assume their own private water supply. These extra

costs add from 10% to 25% to the total machinery and equipment budget of firms (The World Bank, 1998). The existence of inadequate public services can also raise the costs of the poor, who either rely on alternative, costly providers (such as water vendors) or spend large amount of time (as in fetching water from inconvenient sources).

1.3 Study Objective

To address infrastructure expenditure policy in Nigeria and its implications for private sector output the issues to be examined would include:

- An appraisal of infrastructure expenditure policy in the last two decades and the priorities of funding in the same period for the transportation and utilities sectors of the economy;
- Sufficiency of public infra-structural expenditure outlay based on standard indices;
- The impact of public sector expenditure on infrastructure on private sector efficiency and growth in output and attention would be paid to measures of efficiency;
- Policy options.

1.4 Organisation of the Report

For ease of presentation, the paper is organised into seven parts. Part I, the introduction, addresses the rationale and objective of the study, emphasising the poor state of infrastructure in Nigeria and the attendant implications. Part II discusses the conceptual framework and the theoretical linkage between infrastructure expenditure and private sector output. This section also situates the role of infrastructure in economic development. An overview of infrastructure in Nigeria, including broad infrastructure expenditure policy, funding priorities and the general state of infrastructure is the main focus of part III of the study. Infrastructure considered in this section are, transport, communication, electricity, and water. The methodological and analytical framework is discussed in part IV while part V presents the results and major findings of the study. In

part VI recommendations and policy options are provided while part VII summarises and gives concluding remarks.

II.0 CONCEPTUAL AND THEORETICAL FRAMEWORK

Conceptually, infrastructure includes highway, railway, water supply, electricity, telecommunication, sea ports, airports, waste disposal facilities and irrigation. The provision of adequate infrastructure at the right quality enhances the development process, which translates to better and higher quality of life, poverty eradication, low death rate, higher life expectancy and high literacy rate. It improves output, promotes efficient payment system and general development of the financial sector. Each of the infrastructural facilities has a role to play in the development process. Consequently, attempt is made to situate and locate this role.

- The provision of electricity in an adequate and reliable manner promotes production of goods and services in the economy, boosts communication and enhances transportation;
- Postal services facilitate exchange of ideas and markets in business and technology;
- Telephone services enhance communication across nations and globally;
- Effective and efficient transportation facilitates the movement of people, goods and services from the point of production to the markets;
- Adequate supply of water reduces the risk and spread of infectious diseases, improves the health capital stock of the nation, which in turn impact positively on the production of goods and services. At the industrial front, adequate water supply reduces production costs and thus impact on the price of final products.

Further, the concept of transaction cost is the driving force in the analytical framework for infrastructural expenditure. Consequently, this study will establish the fact that poor funding for infrastructural

provisions would raise transaction cost, which in turn affects both public and private sector goods.

II.1 Role of Infrastructure in Economic Development

The linkage between infrastructure and economic development has been firmly established in the literature. For instance, Rosenstein-Rodan (1943) analysed the demand side of capital formation and particularly identified one category of physical capital for special attention in the social overhead capital. In his presentation, he showed that not only was this class of capital characterised by non-convexities, but also constituted necessary preconditions for private sector investment. Also, Aschauer (1989) in linking infrastructure to productivity slow down in the USA, established the empirical connection implied in Rosenstein-Roden (1943).

Cross-country studies, including Uchimuna and Geo(1 993), Shah(1992), Baffesand(1993), Shah(1993), Mera(1973), and Munich(1990) of economic growth and infrastructure, particularly, those concerned with public investment in transportation and communication and those using capital stock of road, railway, and telephone, had shown that infrastructure variables were positively and significantly correlated with economic growth. However, in all the cited studies, the transmission mechanism was not clear, whether infrastructure investment causes growth or growth causes infrastructure investment was not fully established. In addition, there may be other factors such as labour productivity and even external shocks that drive growth outside the impact of infrastructure which were not accounted for in the studies above, Indeed, neither the time series nor the cross-sectional studies satisfactorily explain the mechanisms through which infrastructure may affect growth. However, some sectoral studies focusing on rural infrastructure in some developing countries revealed more about the real routine of the apparent benefits.

Ahmed and Hossian (1990) studying data over time from 85 districts in thirteen Indian states, found that courier transport costs increased farmers access to markets and led to considerable

agricultural expansion and that modern irrigation methods brought higher yield. At the same time, improved communications, through roads which lowered banks' costs of doing business encouraged banks to extended credits to farmer, who used the funds to buy fertilizer, further increasing yields. The study further revealed that villages classified as most developed in terms of access to transport infrastructure were significantly better off than the less developed villages in terms of agricultural production, inter-personal incomes and labour demand and health.

Barring the unobserved differences in the natural resources endowment of the studied villages in the work of Ahmed and Hossian, it is evident that a strong association exists between the availability of certain infrastructure such as, telecommunication, power, paved roads, and access to safe water and economic growth. The theory suggests that infrastructure has a high potential pay-off in terms of economic growth, yet they do not provide a basis for prescribing appropriate levels, or sectoral allocations, for infrastructure investment.

Most developed economies of the world have made substantial investments in infrastructure, achieving dramatic gains for households and producers by expanding their access to services such as safe water, sanitation, electric power, telecommunications, and transport. However, developing nations and emerging economies that are making efforts still need more infrastructure investment and expansion in order to extend the reach of these services to people in the rural areas.

The adequacy of infrastructure determines the success or failure in diversifying production, expanding trade, coping with population growth, reducing poverty, or improving environmental conditions. Good infrastructure raises productivity and lowers production costs, but it has to expand fast enough to accommodate growth. Inspite of the fact that precise linkages between infrastructure and development are still inconclusive, infrastructure capacity and economic output grows in tandem. Thus, as countries develop, infrastructure must adapt to

support changing patterns of demand, as the shares of power, roads and telecommunications in the total stock of infrastructure increase relative to those of such basic services as water and irrigation (World Development Report, 1994).

The kind of infrastructure put in place also determines whether growth does reduce poverty for most countries, more so as most of the poor live in the rural areas, and the growth of farm productivity and non farm rural employment is linked directly to infrastructure provision. Infrastructure services that help the poor also contribute to environmental sustainability. Clean water and sanitation, non-polluting sources of power, safe disposal of solid waste, and better management of traffic in urban areas provides environmental benefits for all income groups. The urban poor often benefit most directly from good infrastructural services because the poor are concentrated in settlements subject to unsanitary conditions, hazardous emissions, and accident risks.

Infrastructure is a necessary, although not sufficient, condition for growth as adequate complements of other resources must be present as well. The growth impact of infrastructure investments also depends on the timing and location of additions to capacity, and on the existing imbalance between supply and demand. Because most infrastructure consist of networks, relieving bottlenecks at certain points of the system can produce very high returns. Adequate quantity and reliability of infrastructure are key factors in the ability of countries to compete in the international market place. The World Bank (1994) observed that because of infrastructural problems, shipping costs from Africa to Europe are 30 per cent higher for plywood (and 30 per cent higher for tuna) than those from Asia to Europe. These costs have to be borne by the exporters, who are mostly private sector operators thereby limiting their capacity to produce and hindering their competitive edge for new export markets.

In the last twenty years or so, major advances in communications, transport, and storage technologies as well as the liberalisation of trade policies in most countries have increased globalization of World Trade. Indeed, about two thirds of production and sales in the OECD countries are processed directly to order, and just-in-time delivery of products due to improved practices designed to reduce logistics costs, including those in transport, have been based on information technologies using telecommunications infrastructure (World Bank, 1994). Cost reductions and the increased speed of freight movements in the past few decades have been increasingly linked to multi-model transport involving containerization, which require intensive coordination by shippers across rail, port, air, and road freight modes.

The linking of business in several countries, producing different components for a final product, requires a highly developed and functional transport and communication infrastructure. The availability of infrastructure services valued by users is also crucial for modernization and diversification of production. The growth of electronic data exchange involving telecommunication is central to efficient operations in manufacturing, services, the financial sector, and government. Availability of power allows substantial improvement in workers productivity (for instance, in the transition from foot-powered to electrically powered sewing), while international telecommunication, facsimile services, and rapid transport of goods enable the artisan to produce to order for a computerized global market. A higher quality of water and sanitation is required to shift from production of raw agricultural commodities to processed foods.

In the area of attracting foreign direct investment (FDI), the quality of infrastructure is an important factor in the ranking of potential sites for location of investment, while the nature of infrastructure is central to the ability of investors to respond to changes in demand and prices.

On the policy front, public spending on infrastructure construction and maintenance can be a valuable policy tool to provide economic stimulus during the period of recession. As long as quality

and cost effectiveness are not compromised, labour-based approaches to infrastructure development can also be a veritable instrument for employment intensive economic growth.

In all, infrastructure investment is not sufficient on its own to generate sustained increases in economic growth. The demand for infrastructure services is itself sensitive to economic growth, which is notoriously difficult to predict. The economic impact of infrastructure investment varies not only by sector but also by its design, location, and timeliness. The effectiveness of investment in infrastructure, whether it provides the kind of services valued by users, depends on characteristics such as quality and reliability as well as on quantity. Adequate supply of infrastructure is essential, just as the efficiency with which infrastructure services are provided is a key to realizing potential returns.

Without doubt, a study of the link between infrastructure investment and productivity is part of the broad goal of understanding the institutional structure of production. In recent times, researchers have come to accept the fact that understanding the institutional structure of production is essential to designing meaningful economic reforms (Datta-Chandhuri, 1990). The concept of the transaction cost is the driving force in the thesis of infra-structural expenditure. Consequently, poor funding would be indicative of poor provisioning of these facilities and that does raise transaction. This, in turn affects both private and public sector outputs. Moreover, output drives price level changes, creates supply bottlenecks and adversely affects economic development.

As noted earlier, there is little doubt that infrastructure generally supports economic activity. What is not obvious is the degree to which such public infrastructure stimulates economic development in specific terms. The study on the relationship between public infrastructure and economic development by Fox and Smith (1990) concluded that infrastructure cannot be expected to stimulate the economies of all communities, but most communities can benefit from exploring new ways to deliver infrastructural services more efficiently. They mentioned

that new infrastructure is less likely to boost economic development in lagging regions than in intermediate or congested regions because few other characteristics are present to attract new economic activities. Some lagging regions actually face dis-investment because of inability to maintain existing facilities.

Building infrastructure probably may not overcome an unskilled labour force, inadequate raw materials, or long distance to market. Thus, the linkage between infrastructure and economic development clearly depends on the individual location. This underscores the need to properly articulate policy on spending priorities that is based on a desegregated study of the particular economy since there will always be a trade off in policy implementation. This trade-off in policy/ programme implementation and management capacity implies that priorities must be set.

For Nigeria, it is timely to evaluate the role of public infrastructure in economic development, particularly, now that the policy thrust of government is oriented towards the private sector.

II.2 Infrastructure and Private Sector Output

Several empirical studies have attempted to shed light on the issue of government investment in infrastructure and private investment. A study by Blejer and Khan (1984) based on cross-country data found that government investment in. infrastructure is complementary with Private Investment while other types of government investment are not. Greene and Villanueva (1991) and Serven and Solimano (1994) arrived at similar conclusions based on multi-country panel data. Musalem (1989) reported that Private and Public investment in infrastructure were complementary in a time-series study of investment in Mexico. Balassa (1998), however, reported Cross-section estimates showing that an increase in public investment in infrstructure led to a decline in private investment. Furthermore, he found a negative correlation between the share of public investment in infrastructure in total investment and the size of incremental capital-output ratios, which indicates that public investment in infrastructure is less efficient than

private investment. Khan and Reinhart (1990) re - examined the differences in productivity between private and public investment for sample of twenty-four developing countries and found that the marginal productivity of public sector capital was negative, although not significant, whereas that of private investment was significantly positive.

Infrastructure represents a veritable input in the production process worldwide. For example, in the economies of Japan and the U.S. for instance, input-output tables indicate that telecommunications, electricity and water are used in the production process of nearly every sector, and transportation is an input for every commodity. Users demand infrastructure services not only for direct consumption but also for raising their productivity by reducing the time and effort needed to secure safe water, to bring crops to the market or to commute to work. Efficient and adequate utilities reduces the costs of manufacturing and services. Poor, inadequate and unreliable infrastructure leads to higher cost of production as manufacturers would have to generate their power from generating sets, sink bore-holes for their water supply, provide their radio communications infrastructure and operate fleet of transportation trucks because the railways have not operated efficiently. This will increase the cost of domestic manufacturing and render the product non-competitive thereby hindering the export capacity and reducing productivity. Inefficiencies in railway transportation are particularly harmful to agricultural sector denying the sector the full benefit of exploiting the natural complementarities of the various agro ecological zones and the different domestic market.

Studies on the impact of infrastructure on specific manufacturing output of some countries illustrate this fact better. Lee and Aros (1992) study of Nigerian manufacturing firm, reported that in the face of chronically unreliable public services, many manufacturing firms had acquired radio equipment for communications, vehicles to transport personnel and freight, and bore-holes to assure their own private water supply. For firms with 50 or more employees that could

practice economies of scale, these extra costs amounted to some 10 per cent of the total machinery and equipment budget. For small firms, the burden could be as high as 25 per cent. The study further attempted a comparison between two countries - Indonesia and Nigeria. On Indonesia, it was found that of the 306 companies surveyed, 64 per cent had generators and 59 per cent (compared to Nigeria's 44 per cent) had bore-holes for their own water supply. Indonesia's largest companies
invested as much as 18 per cent of their capital in private infrastructure, almost twice Nigerian manufacturers' level of 10 per cent. Like in Nigeria, their generators were under-used as it operated at about 50 percent of capacity against Nigeria's 25 per cent. This leaves about 75 percent in the case of Nigeria unutilized thereby compounding the cost of production and efficiency. In a related study, Lee and Usma (1993) found that because public utilities are efficiently run in Thailand, of the 300 manufacturers polled, only 6 per cent had private generators and 24 per cent had private power supplies. The study concluded that the cost of manufacturing in Thailand was almost 48 per cent cheaper than in Indonesia.

Indeed, a review of the empirical research reveals that the productivity effects of public capital vary from negative to positive and from small to large with causality working in either direction (Polenske, 1994). In this direction, observed Polenske that currently, theory provides little guidance regarding possible outcome, but there are three critical issues, which must be addressed:

- The development of clearly stated theoretical expectations concerning the economic impact of public investment that will lead to the design and testing of improved models for gauging the productivity of public investment;
- The improvement of data used in empirical research, particularly regarding infrastructural lives; depreciation, and the role of maintenance on the growth of net capital stock;
- The changing institutional arrangement that affects public investment, especially in view of the current emphasis on

privatisation.

In sum, the linkage between infrastructure and private productivity and output, though not in doubt, needs to be advanced through rigorous models, thus, indicating a compelling need for further research. This is explored in the relevant section of this study.

As a result of the important role infrastructure plays in economic development, particularly in increasing private sector output, we would proceed to examine what the situation is in Nigeria. In this regard, it becomes necessary to first examine the broad policy objectives of infrastructure provision, including the expenditure priorities, as well as the general state of infrastructure in Nigeria. The sufficiency of infrastructure would then be determined from results of the survey of private sector concerns. These form the main focus of the next two sections of this report.

III.0 OVERVIEW OF INFRASTRUCTURE IN NIGERIA

The Nigerian economy has had its own experience in a typical business cycle. Following Independence in 1960, the government, while encouraging private sector initiatives, also believed in accelerating economic development and thus actively participated in providing social overheads, like infrastructure, etc, especially during the Second National Development Plan. The windfall revenue from the oil boom of the 1970s also provided the needed revenue for the direct government involvement in the economy. The inflow of oil wealth empowered government to intensify infrastructural development, thus, controlling the commanding heights of the economy. Government, therefore, used the increased revenue to finance infrastructural expenditure, but failed to adopt commensurate policies to accommodate the dwindling oil revenue when commodity prices fell. The result was a sharp increase in fiscal deficit and inflation. Thus, beginning in 1980, the Nigerian economy went into a recession, which culminated in the adoption of the austerity measure in 1982 by the government. However, the severity of the economic problems that beset the country was underestimated. The succeeding years of 1983

to 1985 witnessed the plummeting oil revenue receipts by the government. This situation was worsened by the soaring external debt. The economy was in serious dis-equilibrium and this necessitated the adoption of the Structural Adjustment Programme (SAP), in 1986. Although, on the face value, SAP seemingly addressed a few of the problems, it did not in real terms redress the structural imbalances that had existed in the country. The mismatch of the revenue and expenditure outlay of government resulted in fiscal deficits in most of the years. Indeed, this resulted in a near collapse of infrastructure in Nigeria. The existing public utilities that accounted for a great chunk of the government expenditure operated in an epileptic manner. Consequently, the overall implication of an inadequate infrastructure as well as the inefficiency in the operations of the functional ones had worsened investment environment in Nigeria with very dire consequences for development.

III.1. Broad Policy Objectives

In what follows, an appraisal of broad policy objectives of infrastructure expenditure would be examined, sectorally.

III.1.1. Transport

The general policy objective of the transport sector was to ensure that road, rail, air and water transport services were organized in such a way as to allow for fair competition between the various modes. In addition, the general policy of government covering all modes of transport was the creation and expansion of indigenous capability to enhance the maintenance of existing facilities and implementation of approved programmes. In pursuit of this policy, all agencies of government in the transport sector were directed to intensify staff training programmes for Nigerians. This, in essence, was a policy of self-reliance, which was vigorously pursued in all sectors of the economy (FDI, P.59). In addition, the policy of Mass Transit Programme was initiated in the 1981-85 National Development Plan with the sole aim of easing the serious problem of commuter transportation which imposed human suffering and a considerable loss in output (FRN,

1981, p.248). The implementation of the Mass Transit policy was, however, delayed until 1988, seven years after its initial proposal.

The impact of Nigeria's transport policy is evident in the progress made in the transport sector since the civil war. Transport policy during the colonial era centred on the construction and/or maintenance of railway and service roads from the main ports in the south to the hinterland for the transportation of trade materials. But post-independence transport policy created a transport system that was capable of carrying a large volume of traffic along land, sea and air routes. Road transport infrastructural development is the joint responsibility of the Federal, State and Local Government in Nigeria. Of the network of over 114,768 kilometers of road in Nigeria, with nearly 30,000 kilometers being good quality roads of reasonable design standards, about a half belongs to the federal government. Most federal roads and important state roads are constructed to a design speed of 100 kilometers per hour with such features as right of way width of 91 meters, a 7.3 meter pavement and five percent maximum gradient (FDI. P.59). Federal Government policy on road transport development centers around maintenance of existing facilities and upgrading of the existing earth/gravel roads.

Significant progress has also been made in bridge construction. Most of the bridges inherited from the colonial administration have either been reconstructed or discarded. The famous Cater Bridge, for example, has been replaced with a modern one. The Onitsha Bridge built after Independence to link the eastern states with their western counterparts, destroyed during the Civil War, has been rebuilt. Other bridges built across major rivers are the Jebba Bridge, the Makurdi Bridge, the Numan Bridge, the Yola Bridge, the Katsina-Ala Bridge and the Calabar-Itu Road Bridge. These bridges perform a major economic function in the transport sector.

The rural development policy of the 1986 when the Structural Adjustment Programme (SAP) started resulted in the construction of rural roads by the Directorate of Food, Roads and Rural Infrastructure

(DIFRRI) in some parts of the country. The Petroleum Trust Fund (PTF) took over development issues during 1993 to May 1999 providing infrastructural facilities including transport system.

In rail transport, the policy thrust was on adequate maintenance of the track and telecommunication system since the present single-track system would continue to serve the country in the fore-seeable future. Other policies aimed at revitalizing the railways were; rehabilitation work under the bilateral agreement between Nigerian Railway Corporation (NRC) and China Civil Engineering Construction Company (CCECC) of 1995, the contract for the supply of comprehensive microwave digital communication to the railway system with Nigerian Railway Development Authority (NAIRDA), in *1997*.

At the seaports, apart from the self-reliance policy of port development, maintenance and repairs involving the Nigerian Ports Plc. (NP plc.), it is government policy to enable the Nigerian National Shipping Line carry a reasonable proportion of the traffic entering or leaving Nigeria. Nigeria's water transport policy of self-reliance in seaports development has led to the building of new seaports and expansion of those inherited from the colonial administration. The provision of adequate port facilities has facilitated loading of vessels with export items and discharging of those with imports. It has eliminated ports congestion, which characterized Nigerian ports in the 1970s.

As noted earlier, air transportation has made major strides in transport development in the country. Through, well articulated, policies, the number of airports has increased from just two at independence to sixteen airfields including eight international airports. In the same vein, there has been significant increase in fleet size from eleven airplanes in 1974 to twenty-five in 1980. However, the 1990s heralded the granting of licenses to private airline operators whose performance has been very impressive. In fact, the market share of private airline and Nigeria Airways on the domestic route stood at 97.2 and 2.8% respectively, in 1997, compared to 96.0 and 4.0% in

the previous year. Air travel has now improved such that the volume of traffic has grown considerably. For instance, the number of passengers carried on local routes was 1,308 million in 1987 and increased by 281.6 % to 4,991 million in 1997. Cargo movements also increased during the same period (CBN annual report).

The policy objective of air transport in Nigeria was to have a safe, reliable, dependable and efficient airline to render services of international standards both on domestic and international routes. Attention is, therefore, focused on restructuring the capital base of the Nigeria Airways to make it more efficient and cost-effective as a commercial concern. For airport development, it is government intention to create indigenous capability for full control of airport facilities including repairs and maintenance. The Federal Airports Authority of Nigeria (FAAN) recently renovated the facilities at the Murtala Mohammed Airport and has upgraded the Abuja airport.

Despite recent financial problems that has plagued the air transport sub-sector, air transportation has contributed immensely to the movement of goods and people across Nigeria.

III.1 .2. Communication

The main policy objective of the communications infrastructure was the provision and maintenance of adequate communication services with emphasis on speed, reliability and efficiency in the utilization of installed telecommunications and postal facilities. It is government policy that the communication infrastructure is so re-organized as to respond to market forces and be managed on a business-like basis (FRN, 975, p.321). To achieve the policy objective of commercialization, the Nigerian Postal Service Department (NIPOST) was established to replace the defunct Post and Telecommunication (P & T) while the Nigeria External Telecommunication (NET) was reorganized and renamed Nigerian Telecommunication Limited (NITEL). The impact of the new policy has been significant. NIPOST, for instance, has purchased and commissioned a number of river-crafts for speedy delivery of mail services in riverine areas. It is the intention of the

Ministry of Communications to ensure that any mail posted in any part of the country is delivered not later than the third day of posting at even the remotest part of the country. Also, for speedy delivery of mails outside the country, NIPOST introduced the Expedited Mail Service (EMS) between Lagos, Great Britain and the Netherlands. This service guarantees the delivery of mails to their destinations within twenty-four hours. The communication policies have also resulted in some degree of both quantitative and qualitative improvements in the telephone services. There are currently over two million exchange lines in the country while all state capitals and commercial centers with primary telephone centers have been connected to the national long distance telecommunications network. In general, post-war Nigeria has concentrated attention on modernizing its postal and telecommunications services in order to make them adequate, efficient and reliable for rapid development of the economy. In consonance with the policy of liberalizing telecommunication services, private telecommunication services providers have consolidated their operation. Private telecommunications operators like the Nigerian Mobile Telecommunication Ltd. (M-TEL), Intercellular Ltd., etc, among others. have joined in providing new product to complement those provided by NITEL. Also private courier companies continue to provide mail/parcel delivery services which supplemented the services of the NIPOST.

III.1.3 Electricity

The decree (No.24 of 29th June, 1972) establishing the Nigerian Power Authority (NEPA) states that it would develop and maintain an efficient, coordinated and economical system of electricity supply for all parts of the country. This function was assigned to NEPA in recognition of the crucial role of power infrastructure in the socio-economic development of the society. In the Fourth National Development Plan, government policy objective was to provide adequate, regular and uninterrupted power supply. In pursuit of this

policy, efforts were to be stepped up to increase the generating and transmission capacity of NEPA and to expand and improve the distribution facilities to accommodate load growth. In addition, government was aware of the need for a coordinated and comprehensive energy policy that would be responsive to the changing needs of the economy. Consequently, government decision was to commission policy oriented energy studies to determine, on the basis of comparative cost, the optimal mix of the various energy sources - coal, gas, oil and hydro power to meet current and projected energy requirements for industrial, commercial and residential uses. Broadening the resource base for energy generation was, therefore, a major policy goal of the Fourth Plan. Demand management and rural electrification were other areas of policy emphasis (FRN, 1981, pp.18 1-1). Despite some shortcoming, there has been rapid progress in the growth of the electricity infrastructure since 1970.

III.1.3.1. Installed Capacity

The production of electricity in Nigeria between 1960 and 1985 had been from both hydro and thermal sources. In 1960, the total installed generating capacity in Nigeria was 135.8 megawatts (MW). This was produced by twenty-two generating stations scattered all over the country and consisted of 17 diesel plants, one gas-turbine plant, three gas-fired steam plants and one hydro plant in Southern Cameroon. (NEPA,. 1986,p.5). By the end of 1985, the total installed capacity had grown to about 3,800 MW, which grew further to 4,549 MW in 1996. For purpose of effective distribution of power supply, the country has been divided into five zones called Directorates. Those are the Lagos, Western, Kaduna, Eastern and Jos Directorates with Head Office in Lagos, Ibadan, Kaduna, Enugu and Jos respectively. NEPA's most experienced engineers and administrators are in charge of the Directorates. District Managers who are responsible to the Directors of Distribution would perform distribution functions, at the State level. NEPA believes that with the experience gained and

removing some constraints, it will be possible to provide adequate and reliable power supply to all parts of the country in line with government policy.

III.1.3.2. Electricity Generation

Aggregate electricity generated in Nigeria had been increasing. For instance, in 1970 aggregate electricity generated stood at 1,547.0 million kWh and by 1980 it increased to 7,140.4 million kWh. By 1995 it stood at 15,856million kW/h, and then rose by 1997 to 16,116.9million kW/h. However, this was a decline of 0.6 percent from its level in 1996, in contrast to increases of 2.2 and 2.1% recorded in 1996 and 1995 respectively (Table 3.1). The fall has been accounted for by respective decreases of 0.4 and 0.2 per cent in hydro and thermal energy generation by NEPA as operations at .Egbin, Sapele, Afam, Kanji and Jebba power stations had been complicated by valve leakages, overheating, lack of spare parts, under funding and vandalization.

III.1.4. Water

The main policy objective for water supply was the provision of access to safe and reliable drinking water for a large section of the population. As spelt out in the Fourth National Development Plan, the target for the urban areas was that no family should live more than 200 meters away from a stand pipe and in the rural areas, the time spent in fetching water should be drastically reduced. The policies to ensure adequate supply of quality water included:

- Strengthening and reorganization of State Water Corporation/ Boards and encouraging them to pursue policy of cost recovery based on reasonable user charges (Iniodu, 1988);
- Identification and exploitation of new sources of water by the River Basin Development Authorities and State Water Boards/ Corporation;
- Manpower training in the water supply sector and mass education of rural dwellers on the advantages of boiling water for drinking; and

- Establishment of water quality control laboratories by the State Water Boards/Corporation.

These water policies are being pursued with vigour to various levels. These include the Federal Government through River Basin Development Authorities, the State Governments, through the various State Water Boards/Corporations, the United Nations Children's Fund (UNICEF) project, the Local Government and rural community self-help projects. Thus, an increasing percentage of Nigerians, including rural dwellers, are benefiting from the rural pipe-born water scheme as against only about 2.00 percent in 1978 (FRN, 1981, p.324). The UNICEF Projects in Nigeria include the provision of rural drinking water through low-cost bore-holes. Over 1,500 wells with hand-pumps serving over one million people have already been drilled in four states of the federation. The rural water scheme, in general, is part of the overall strategy for rural development.

As with other sectors, the major problems observed in the area of water resources development was inadequate funding and high cost of materials (chemicals) such as alum and kaolin and drilling equipment. For example, the Federal Government allocations to Federal Ministry of Water Resources and Rural Development in 1991, was N83.8million or 0.02 per cent of Annual Federal Budget but by 1997 it rose, by 10.9 per cent of the budget, to N2,435.0 million. In order to supplement the efforts of government, some loans were obtained from and/or negotiated with several International agencies such as the World Bank, ADB, Commonwealth Science Council (CSC) etc.

III.2 State of Infrastructure in Nigeria

An attempt is made in this section to analyse in detail the state of each infrastructural facility put in place in Nigeria. Specifically, the state of the following, Transport (road, water, rail and air transport system), Communication, Electricity and Water Supply.

III.2.1 Transport

III.2.1.1 The Road System

Road construction has become a part of town and country development in Nigeria. The road transport is the most important element of the transport system, both in terms of traffic and investment. This is explained by the huge allocation of public sector expenditure to transport, in each of Nigerian's four Development Plans and the Rolling Plans, already executed. It attracted 85.0 percent of the 1981-1985 allocations. (Table 3.2).

The current road network, in the country, links areas of commercial, economic, political and social activities, and ensure the free flow of goods and services. The system is both longitudinal and horizontal, running from south to north, linking ocean terminals, and sea and river ports in the rich agricultural south and the grazing lands of the north and from east to west, linking commercial and Industrial Centres.

The construction and maintenance of roads and bridge until recently had been the concurrent preserve of the three tiers of government in Nigeria. Thus, in 1980, there were 114,768 kilometres of Federal and State Roads. From 1986 - 1995 the total road network in Nigeria was approximately 171,328 kilometres. Of this amount Federal Highway was 32,100 km while state roads was 30,548 km and the balances of 1,081,670 km are local government roads. Of the Federal highways network which forms the primary axis of the system, 23,193 km are paved while 8107km are unpaved (Federal Ministry of Works).

The Federal road network system accounts for about 70% of movement of goods and persons in the country. The Federal highways are special roads designed to link up not only geographical and economic parts of Nigeria but also to provide road communication network with neighbouring African countries.

The Directorate of Foods, Roads and Rural Infrastructure (DFRRI) programme covered four broad areas and rural road construction rehabilitation was one of them. The first of this rural road

construction rehabilitation programme did not cover culverts and bridges thereby constraining the effective use of the roads. Indeed in 1990, a total of 30,728.34 km of roads were completed by DFRRI and accepted as having met specification under the second phase of the project. About 7,378.83 km was adjudged to require further work. This however showed that most of the DFRRI's roads were poor in quality. In spite of all these, road network in Nigeria is inadequate in terms of total length relative to the size of the county (933,768 square kilometres) and in terms of the quality of roads. This was why the Federal Government in the mid-1990s started the Petroleum (Special) Trust Fund (PTF). The Fund began operation in 1996 and rehabilitated some collapsed and unusable highways and intra city roads in some states. Major highways rehabilitated through PTF funding in 1997 alone included Abuja Lokoja, Jos - Keffi, Ile-Ife - Ondo and Calabar - Ogoja.

From practical experiences, it has been observed that the progress of roads segment of the transport sub-sector moves with the condition of the economy. To this end, while most of the rural areas have not been connected with the nations road network as a result of dwindling public sector revenue, the same reason has accounted from the state of disrepair of both urban roads and Federal highways. In view of this, the Federal Government embraced private sector participation in road maintenance option for its highways. This is by way of charging tolls in selected Federal highways with the aim that the funds realised would complement budgetary allocation for road maintenance. This led to the Build Operate and Transfer (BOT) Scheme, initiated in 1995, as a way of involving the private sector in road construction and maintenance.

III.2.1.2. Water Transport System

Development of water transport in Nigeria since Independence has been remarkable especially in seaport development. In fact, this is an area where facilities had been adequately provided; substantial

investments have been made to develop the nation's seaports in Lagos (Apapa and Tincan Island), Calabar, Port Harcourt, Sapele, Warri and other numerous jetties located in the riverine areas. To improve facilities for maritime business, the government established the Nigerian National Shipping Line (NNSL) which was liquidated in 1992 on account of poor operating results and replaced by The Nigerian Shipping Company. The National Maritime Authority (NMA) was also established in 1987 to aid the development of indigenous shipping activities as well as implement the 40-40-20 cargoes sharing formula of UNCTAD, aimed at encouraging developing countries to participate in the freighting of their merchandise cargo.

Port development, operation and maintenance are the exclusive responsibility of the Federal Government who delegates these functions to the Nigeria Ports Authority (NPA), a statutory corporation, created by the ports act of 1954 (cap. 155 of the Laws of the Federation of Nigeria and Lagos), now known as Nigerian Ports Plc. It commenced operations in April 1955. Shipping activities have been predicated on the trend in merchandise trade. For example, the number of ships that entered and departed Nigeria as well as the volume of non-oil shipment were at their peak between 1975-1985 indicative of the thriving economy before the downturn of the economy in 1986 (Table 3.3).

In 1997, some improvements were recorded mainly as a result of port reforms, rationalization of various port charges, easier access to foreign exchange which facilitated increased tempo of merchandised trade. A total of 2,464 ships, with net registered tonnage (NRT) of 11.9 million tonnes, berthed at the Nigeria ports. This was an increase of 20.6 percent over the level in 1996. Also 2,510 ships with (NRT) of 11.9 million tonnes departed the Nigerian ports, representing an increase of 19.3 percent over the number shipped out in 1996 (Table 3.4).

III.2.1.3. Railway Transport System

The Nigerian Railways system, which is fully managed and controlled by the Nigeria Railway Corporation (NRC), was established in 1955. It is made up of 3,505 kilometres of single-track route of 1.06 metre square. The only extension since independence has been a 643.74 kilometre route in 1964 linking Kuru on the Kafanchan- Jos line through Bauchi to Maiduguri. The railway systems consist of two main routes linking the two major ocean ports of Lagos and Port Harcourt with some state capitals, industrial and commercial centres in the country. It has attracted long distance travellers on routes linking Lagos - Kano, Port Harcourt - Kano, Lagos - Jos, Lagos - Maiduguri, Port Harcourt - Jos and Enugu - Maiduguri, etc.

The performance of NRC has not been quite satisfactory over the years. Congestion and frequent delays as well as cancellations of travel schedules have become regular features of passenger train operations. Goods have, also, not been moved promptly. Various reasons have been attributed to these inefficiencies. They include (a) poor funding; (b) unserviced tracks, coaches, wagons and locomotive; (c) acute shortages of maintenance locomotives, spare parts and repair kits; (d) non-payment of salaries; (e) strikes and poor management. In fact, the number of locomotives had decreased from 219 at the inception to less than 75 by 1995. As a result, the number of passengers carried declined from the peak of 15 million in 1984 to 2.9 million in 1995 and the tonnage of goods carried also diminished from 111 million in 1979 to 0.1 million in 1995. Consequently, the Corporation and the China Civil Engineering Construction Company of the Ministry of Railways of the Peoples Republic of China signed a bilateral agreement in 1995 for the rehabilitation and refurbishment of existing locomotives and other facilities especially communication equipment. By 1997, available data showed that the services of the Nigerian Railways Corporation had improved. The number of passengers carried rose to 179.0 million from 170.0 million in 1996, while the tonnage of goods carried increased to 120 thousand tonnes from 114 thousand tonnes. (Table 3.5).

III.2.1.4. Air Transport System

Aviation is the newest in Nigeria's transport system. Its history can be traced to the creation of the Nigeria Airways in 1959 to replace the West African Airways Corporation. Aviation in Nigeria is managed and controlled by Nigeria Airways Limited which has scheduled domestic air services as well as scheduled international air services to major airports in Europe, Africa and North America.

Air travel has so much grown in importance that the number of airports and landing facilities significantly increased. Nigeria now has sixteen airfields including eight international airports in Lagos, Kano, Port Harcourt, Ilorin, Maiduguri, Calabar, Sokoto and Abuja as against only two at independence. In fact, the Abuja International Airport was recently upgraded to accommodate International travels outside Nigeria. The rapid progress in air transportation is consistent with government commitment to the development of an efficient air transport system in the country as portrayed by the allocations to the Air Transport sub-sector in the fourth development plan.

The fleet size rose from eleven aeroplanes in 1974 to twenty five in 1980, including six medium long haul jets. The operational statistics of the Nigeria Airways showed some improvements in the level of operations between 1985 and 1986 except for the decline in cargo tonnage on local and other international routes in 1986 and declines in mail tonnage and freight tonnage in 1986. Similar declines were observed in same areas in 1987. These declines in a few areas seem to be compensated for by the heavy increases in other areas such as cargo tonnage on all routes in 1987, mail tonnage/km in 1987 and freight tonnage on all the routes in 1987 (Table 3.6).

Despite recent developments and investment in air transport facilities, many problems still confront air transportation in Nigeria. These problems were highlighted in the Third National Development Plan thus:

> ***The* necessary *increases in organizational and managerial capacities as well as professional and technical skills available have not accompanied***

> ***the recent period of expansion of the Airways investment in aircraft to the Airline. The quality of the Airline's management continues to present problems. The Company is now about to undertake all routine maintenance locally but still depends on foreign institutions for the major repairs to its aircraft. Supervisory and operational procedures all require up grading. The same is true of communications and other services. Until the Company's financial and management information system is considerably improved and an effective planning unit is set up, the organization cannot hope to grow in the keen international competition of today's airllne industry (FRN. 1985, P.218).***

In addition to organisational and management problems, the Nigeria Airways is confronted with financial problems. By the end of June 1988, the company was saddled with a huge internal and external debt of three billion Naira. (Ezechukwu, 1988). The Airways fleet of operational aircraft had reduced drastically. And this had affected both its domestic as well as its scheduled international services. However, the private sector had responded positively to incentives offered by the airport development by investing in airline services business. Thus, the monopoly formerly enjoyed by Nigeria Airways in domestic service was broken since 1990 with the granting of licence to Qkada Airline to operate scheduled passenger and cargo services. In 1997, the market share of private airlines and Nigerian Airways on the domestic routes stood at 97.2% and 2.8%, respectively (1997, CBN Annual report). The Private airlines are now covering both domestic and international routes, in particular, some abandoned routes in the West African sub-region.

III.2.2. Communication

Telecommunication and postal facilities and services have also been developed, on network basis, as an essential medium of relating

with distant places or sending messages and letters. Data available from the Nigerian Telecommunications Limited (NITEL) showed that as at 1994, 405.6 million telephnne sets and 7,280 telex sets were available in the country (Table 3.7). Similarly, data on the activities of the Nigerian Postal Services (NIPOST) during the same period showed a total of 3,623 postal facilities; 788 of which were full-fledge post offices, 2,687 postal agencies while the remaining 148 were sub-post offices. Apart from the official provision of facilities, private firms have also been involved in the provision of both postal and telecommunication services. However, in spite of all these efforts, Nigeria is still grossly under served with communication facilities. Furthermore, the time taken by correspondence from one place to another, through NIPOST, is still very long while the number of successful telephone dial calls continues to diminish. The main problems responsible for the low performance rate, in the sector include; (a) scarcity of technical and engineering staff; (b) sub-standard equipment; and (c) poor maintenance of available equipment and poor management.

III.2.3. Electricity

Power supply plays a crucial role in the economic and social development of any nation. Electricity provides power for manufacturing and service enterprises as well as for irrigation in the agricultural industry. It is in recognition of the vital role of electricity that this sub-sector had been included in the economic sector of the national economy for development purposes. Unfortunately, however, the supply of electricity in the country has been inadequate to cope with the growing demand for residential, industrial and commercial consumption. There have been frequent power failures and load shedding all over the country. Power interruptions, even for very brief periods, have high economic costs. Not only do power failures reduce output of goods and services, they also cause damage to plant and equipment and household electrical appliances. Intermittent power supply has been one of the greatest bottlenecks that have marred the economic and social progress of Nigeria. In order to reduce the loss

due to frequent power outages, commercial and industrial establishments in the country as well as individuals have resorted to the use of standby generators characterised by high unit costs.

Electric power generation, transmission and distribution in Nigeria is undertaken by a government parastatal known as the National Electric Power Authority (NEPA) which evolved from the erstwhile Electricity Corporation of Nigeria (ECN), established in 1950 and which existed up till 1970. Soon after independence Nigeria accepted the development of electricity from water as the most sensible course to follow because it does not involve the hauling of fuel from one place to another and because water is a source from which energy could be tapped indefinitely (FDI, 1985, P.49). This was why the Kanji Dam project was initiated in the First National Development Plan. The first phase was completed on schedule in December 1968. Others include the Onitsha Hydropower project (750 mw), Zunguru on River Kaduna (500 mw), Katsina - Ala on Katsina - Ala River (260 mw) and the Mambila Plateau-Donga River Basin (1,250 mw).

But this does not imply that thermal power has no place in Nigeria's electricity development. In fact, about 30.0 per cent of Nigeria's total power supply is from thermal sources (gas, steam and diesel). To meet with the increasing demand for electricity, NEPA developed additional electricity generating and transmission capacity in the 1980s with heavy investment outlay on hydropower, gas and steam turbines. Six thermal and three hydropower stations and seventy-three generating units with a total installed capacity of approximately 6,098 megawatts (MW) were functional. The thermal power stations are located at Afam, Delta, Egbin, Sapele, and Ijora with a generating capacity of 100 MW, 820 MW, 1,320 MW, 1,020 MW, and 66 MW, respectively. The hydro power stations are Jebba, 578 MW, Kanji, 760 MW and Shiroro, 600 MW.

Generated electric power is transmitted through numerous transformers, reactors, circuit breakers and transmission lines spread all over the country. With the installed capacity, generation by the national grid rose progressively from 1,547.0 million kilowatt hours

(mkh) in 1970 to 4106.2 mkh in 1976 and 7,410.4 mkh in 1980. By 1985, electricity generation had increased to 10221.1 mkh and later to 13,462.9 mkh in 1990 before attaining an all time high of 16,116.9 mkh in 1997. In the same vein, total electricity consumption maintained an upward trend from 1970 to 1994. For instance, total electricity consumption rose from 1,272.8 mkh in 1970 to 3,239.3 mkh in 1976, 6,285.0 mkh in 1985 and 8,843.2 mkh in the first half of 1997. With respect to the share of electricity consumption, those of industrial and commercial consumers declined progressively from 65.5 per cent of total consumption in 1972 to 47.5 50.0 per cent, respectively, in 1994 and 4th quarter of 1997. Residential consumption component, on the other hand, increased from 34.5 per cent in 1972 to 58.5 per cent in 1994 and 50.0% in 1997(see table 3.1). The Authority is faced with a situation whereby the power generation capacity is poorly under-utilised, as approximately 50 percent of the total installed capacity of the stations is currently being utilised. Furthermore, the percentage of total electricity generated that is consumed has been fluctuating over the years, with a deterioration in transmission and distribution.

III.2.4. Water Supply

Substantial funds have been channelled into the development of water resources. Total volume of available treated water as at the end of 1995 was 5140,000 million cubic metres. Of this, domestic use accounted for 12.9 per cent while industrial use and irrigation had respective shares of 24.5 and 32.0 per cent. In 1997, the total volume of available water had increased marginally to 5,159,785 million cubic metres. This is made up of 13.2, 25.0, and 35.0 percent for domestic industrial and irrigation use respectively (Table 3.8). The Federal Ministry of Water Resources and State Water Boards had stepped up efforts in the provision of water while external support agencies (ESAs) supplemented the efforts through various grants and aids. Although, budgetary allocation to water resources had been on the increase since the past five years, many communities are yet to have

access to treated water. There is also persistent shortage of portable water even in major cities where facilities have been installed.

III.3. Appraisal of Funding Priorities

Government expenditure policy represents an overall aspect of fiscal policies towards expenditure programmes to meet the goals of stable long-term growth, economic efficiency and provision of good living standards for its people. The starting point of the theory of public expenditure recognizes the failure of the market mechanism to respond fully to the needs of the society. The type of investment needed at the earliest stages of development frequently includes very large outlays such as those involved in the development of infrastuctural systems. Infrastructure investment performs a major role in the design of development plans as government is expected to engage in both directly productive activities and social overhead of transport, communication, electricity, water, etc. This underscores the need for national development planning. Thus, within the period covered by this study, 1970-1998, Nigeria has had about six phases of development planning. These are (i) The Second National Development Plan, 1970-1975; (ii) The Third National Development Plan, 1975-1980; (iii) The Fourth National Development Plan, 1981 - 1985; (iv) The Structural Adjustment Programme Era, 1986-1988; (v) The 3 years rolling Plans 1990-1 995; (vi) The National Rolling Plan, 1997-1999.

An appraisal of these Development Plans, with bias to infrastuctural expenditure provides an evaluation of the funding priorities of government. This will be done at three time periods, namely, 1970-1985, SAP Era, and the three-year Rolling Plan of 1990-1997:

III.3.1. Pre-Structural Adjustment Programme Era (1970-1985)

During this period, target performance in terms of the planned and actual allocation of resources in the National Development Plan (Table 3.9), and the achievement rate, moved from 66.8 per cent in the second plan to 69.2 and 41.1 percent in the third and fourth plans respectively. The Planning experience with respect to physical

structures presented a gloomy picture. Physical structure implementation involved so many uncompleted projects all over the Federation and some in different stages of decay and abandonment. Infrastructural development achieved some degree of growth in the area of road construction, airports and seaports modernization. However,, telephone and pipeborne water were still a luxury available only to the urban dwellers and a few rural inhabitants. Electricity supply was erratic and transportation was in crisis.

III.3.2. The Structural Adjustment Programme (1986-1988)

During this period the structural imbalances were adjusted particularly in the areas of eliminating the over-valuation of the naira exchange rate and liberalising the financial markets. Capital expenditure was curtailed and infrastructural development suffered neglect. The maintenance policy or culture was not given due regard while the infrastructural facilities which were to complement the adjustment of structural imbalances could not measure up, creating more bottlenecks and vicious cycle.

III.3.3. The Three Year Rolling Plans (1990-1997)

The performance of the rolling plans was also not very impressive. Resources were thinly spread that some infrastructural facilities such as highways and other public utilities were not regularly maintained. For instance the Federal Government capital expenditure in the period 1990-1998, showed that transport and communication received N451.8m in 1991 and N 1162.5m in 1997 representing a 58 per cent increase. This figure however, increased to N 8525.5 in 1998. The N8525.5 was a mere 3.6% of total capital expenditure for 1998 which was N 237,085.8 million (Table 3.10).

IV.O METHODOLOGY

IV.1 Survey of Selected Private Economic Sectors

To analyse the impact of infrastructure expenditure on private sector output, a structured questionnaire was developed and