

CHAPTER 1

INTRODUCTION

1.1 Background to the Study

Nigeria is blessed with huge physical, human and natural resource endowments yet the majority of its population live below both the absolute and relative poverty lines. The national survey conducted between 2003 and 2004 shows that slightly above half of the population (51.6 percent) live below US\$1 dollar per day and the relative national poverty incidence was found to be 54.4 percent (National Bureau of Statistics (NBS), 2005, 2008). However, the most current Human Development Report by the United Nations Development Programme (UNDP, 2009) shows that about 64.4 and 83.7 percent of the population lives below \$1.25 and \$2 a day, respectively. This poverty situation is worse in the rural areas where over 70 percent of the people reside and earn their living through agriculture than in the urban areas. More than 86.5 percent of the rural population is engaged in agriculture (NBS, 2005). This invariably leaves agriculture as a key sector capable of affecting majority of Nigerians in diverse ways. Therefore, the persistence of hunger and poverty in Nigeria must be, to a large extent, the failure of the agricultural sector to fully impact positively on the people.

Agriculture plays a cardinal role in Nigeria's economy contributing the greatest share to the nation's gross domestic production (GDP). For instance, 2008 agriculture's contribution to total real GDP was 42.07 percent with crop, livestock, forestry and fishery accounting for 37.52, 2.65, 1.37 and 0.53 percent, respectively (NBS, 2007; Central Bank of Nigeria (CBN), 2008). This implies that the crop sub-sector contributed 89.2 percent of agriculture GDP. Further, agriculture generates employment for over 70 percent of the total labour force, accounts for about 60 percent of the non-oil exports and, perhaps most important, provides over 80 percent of the food needs of the country (Adegboye, 2004; Onwuemenyi, 2008; CBN, 2008). Despite these indicators, Nigeria's agricultural performance in recent times remains inadequate and indeed far less than its potentials. Food demand exceeds the supply thus leading to large importations of food, which further erodes the economies foreign

exchange. The growing food import over the years gave rise to escalating foreign exchange expenditures, which could have been invested in other areas of the economy. The food import bill for Nigeria rose from N3.474 billion in 1990 to N 654 billion in 2007 where as it could only boast of agricultural export worth of N73.3 million (CBN, 2007); and this trend has not yet changed. At the heart of this inadequacy of the sector lies the foremost problem of low productivity, as will be clarified later in this introduction. Low productivity in the country could be as a result of a number of factors, which may be direct or indirect. With the fast increase in human population in the country, there is no doubt that resources are becoming scarcer than ever before and therefore development strategies should focus on strategies that are intended to increase the productivity of scarce resources.

Although small scale farmers dominate agricultural production in Nigeria and individually exert little influence, collectively they form the foundation upon which the economy rests. About 90 percent of Nigeria's total food production comes from small farms and at least 60 percent of the country's population earns their living from these small farms with farm sizes generally less than 2 hectares (Oluwatayo et al. 2008). Unfortunately, these small scale farmers are subsistence farmers and use crude and traditional production techniques. This has contributed to the poor performance of the sector. Therefore, effective economic development strategy will depend critically on promoting productivity and output growth, particularly among small-scale producers since they make up the bulk of the nation's agriculture. To boost the agricultural production base of the country, a number of policies have been put in place and these in a broad sense, include: (i) the achievement of self-sufficiency in basic food supply and the attainment of food security; (ii) increased production of agricultural raw materials for industries; (iii) increased production and processing of export crops, using improved production and processing technologies; (iv) generating gainful employment; (v) rational utilization of agricultural resources, improved protection of agricultural land resources from drought, desert encroachment, soil erosion and flood, and the general preservation of the environment for the sustainability of agricultural production; (vi) promotion of the increased application of modern technology to agricultural production and (vii) improvement in the quality of life of rural dwellers.

Maize is one of the main staple crops in Nigeria and featured among the five food crops (cassava, maize, wheat, rice and sugar) whose production is to be promoted for attainment of food self-sufficiency as revealed by the Minister of Agriculture and Water Resources (Sayyadi, 2008). In Nigeria, maize production ranks third after sorghum and millet among the cereal crops (Food and Agriculture Organization Statistics (FAOSTAT), 2009). A survey conducted in Nigeria reveals that maize accounts for about 43 percent of calorie intake, with income elasticity of demand of 0.74, 0.65 and 0.71 for low income, high income and all sample households, respectively and contributes to 7.7 percent of total cash income of farm households (Nweke et al. 2002; Nweke, 2004; Alabi and Esobhawan, 2006). Apart from being a food crop, maize has equally become a commercial crop on which many agro-based industries depend on for raw materials (Oluwatayo, et al. 2008 and Babatunde et al. 2008). Maize contributes about 80 percent of poultry feeds and this has great implication for protein intake in Nigeria (FAO, 2008). Thus, maize can be considered very vital to the economic growth of the nation through its contribution to food security and poverty alleviation.

Land area under maize increased from 653,000 ha in 1984 to 5m ha as at 2007 and production also increased from 1m to 7m tons during the same period (International Institute of Tropical Agriculture (IITA), 2007). The average yield of 1.4-1.5 tonnes/ha being obtained in Nigeria is low compared to other places. For instance, FAOSTAT (2009) production statistics from 1990-2007 shows that world maize average yield was 4.3 tonnes/ha, average yield for Kuwait was 18.4 tonnes/ha, Jordan, 16.2 tonnes/ha, New Zealand, 10.2 tonnes /ha, Chile, 9.5 tonnes/ha, Egypt, 7.1 tonnes/ha, Mauritius 5.8 tonnes/ha, South Africa, 2.5 tonnes/ha, Algeria 2.4 tonnes/ha, Cameroon, 1.9 tonnes/ha, Ethiopia, 1.8 tonnes/ha and Kenya, 1.7 tonnes/ha. According to IITA (2007, 2009), Nigeria's low maize productivity was attributed to poor seed supply system, little or no use of improved seeds, herbicides and fertilizers, increased levels of biotic and abiotic constraints, low investment in research for development, inefficient marketing systems, the fact that prices of inputs have tripled in the last ten years and also global warming and its associated effects which have contributed to this by changing the rainfall pattern leading to erratic and unreliable rainfall, in some cases resulting in drought.

Maize is planted in all the six ecological zones (namely Northcentral, Northeast, Northwest, Southeast, South-south, and Southwest) in the nation and serves as an important source of income to farm households. Until recently, the bulk of the maize grain produced in Nigeria was from the south-western zone. However, it has been acknowledged that dry grain maize production has shifted dramatically to the Northern Guinea Savannah (located in the north central zone), which is now regarded as the maize belt of Nigeria (Ogunbodede and Olakojo, 2001; Iken and Amusa, 2004) and the study area, Benue State is located in this zone. Further, Manyong et al. (2003) identified the north central zone to have a comparative advantage in maize production over the rest five zones. Due to high solar radiation and low night temperatures in the Northern Guinea Savanna (NGS), the area has high potential for maize production (Carsky et al., 1998).

The federal government under the leadership of President Olusegun Obasanjo in 2006 initiated a programme to double maize production in the country both for national consumption and international export through promotion of improved agricultural technologies (United States Agency for International Development (USAID), 2006). Since then, several stakeholders have alleged their support for this program. Apart from the federal government policy to promote increased application of modern technologies, several research institutes in the nation like International Institute of Tropical Agriculture in collaboration with Institute of Agricultural Research and Training, National Rice/Maize Center, National Accelerated Food Production Program, Institute for Agricultural Research, National Cereals Research Institute, National Agricultural Extension and Research Liaison Services also came up with the initiative of doubling maize production by 2008. This is in view of the high level demand for maize in industries (flour mills, breweries, confectioneries etc), for human and animal consumption. More over, maize is among the crops of interest in the 2008 President Umaru Yaradua seven-point agenda. Thus, every attempt to boost its production is expected to enhance food security, serve as import substitution and earn foreign exchange for the country through export to food deficit countries (IITA, 2007).

Given the consistent low maize productivity and the technological innovation policies in Nigeria aimed at increasing the productivity of maize, it becomes essential to

understand the efficiency with which farmers use the production technologies and since the development of technological innovations often come at a cost, ascertaining their feasibility in terms of impact on farm households in general and farm efficiency in particular is very crucial for policy analysis. The investigation of farm efficiency has fuelled a large body of literature globally and is of vital importance both from microeconomic and macroeconomic points of view. Improving the efficiency with which farmers use the available technologies is very crucial to increasing productivity, household income, food security, and overall economic growth and poverty reduction. There are three main efficiency measures namely technical, allocative and cost efficiency. In microeconomic theory, the primal production frontier describes the maximum output that may be obtained from given inputs. Any deviation from the maximal output is typically considered technical inefficiency. A firm that operates at the production frontier has a technical efficiency of 100 percent. Even though farmers may be technically efficient, they may not be cost efficient because they are allocatively inefficient. That is, they do not utilise the inputs in optimal proportions, given the observed input prices, and hence do not produce at minimum possible cost. Hence the modelling and estimation of both technical and allocative efficiency of agricultural production is often motivated by the need for a more complete representation of economic or cost efficiency of farmers implied by the economic theory of production.

Two broad approaches are usually followed in efficiency analysis in the literatures; parametric and non-parametric approaches. The parametric approach requires specification of the underlying technology and or assumption about the distribution of the inefficiency term while the non-parametric approach neither require a specific functional form nor an assumption about the inefficiency term but rather requires solving linear programs in which an objective function envelops the observed data; then efficiency scores are derived by measuring how far an observation is positioned from the “envelope” or frontier.

1.2 Problem Statement

The global food crisis is increasing with alarming speed and force, necessitating nations and international organizations all over the globe to respond with a strategic

and long term approach. It has been observed that the current crisis is caused by a web of interconnected forces involving agriculture, energy, climate change, trade, and new market demands from emerging markets and therefore has grave implications for economic growth and development, international security, and social progress in developing countries (Centre for Strategic and International Studies (CSIS), 2008). Nigeria too is currently experiencing food crisis. This has been attributed to low productivity in the agricultural sector necessitating huge food imports. Maize being a major staple in Nigeria is of vital concern to agricultural policy decisions. Current production is about 8 million tonnes and average yield is less than 1.5 tonnes per hectare. This is far below the potentials of the Nigerian maize sector. A recent empirical research shows that local maize farmers in Nigeria can raise yield to about 4.2 tonnes/ha and national production could hit 20 million (IITA, 2009). The average yield is low when compared to world average of 4.3 tonnes/ha and to that from other African countries such as Egypt and Mauritius with 7.1 and 5.8 tonnes/ha, respectively (FAOSTAT, 2009). Thus, there has been a growing gap between the demand for maize and its supply arising from low productivity. The stronger force of demand for maize relative to supply is evidenced in frequent rise in the price of maize and therefore has great implication for the food security status and economic development of the Nigerian economy. The price of maize increased by about 70 percent between 2006 and 2008 (Badmus and Ogundele 2009).

The limited capacity of the Nigerian maize economy to match the domestic demand raises a number of pertinent questions both in the policy circle and amongst researchers. For instance, what factors explain why domestic maize production lags behind the demand for the commodity in Nigeria? To bridge the demand-supply gap, effort has to be channeled towards increasing its productivity. Theoretically, increasing the productivity of maize production would require either increased input use especially acreage expansion, improvement in resource use efficiency and or technological change derived from use of new technologies. Given the constant population pressure and other social and economic constraints in Nigeria, acreage expansion as a source of increased productivity has little application. Hence, the country is left with the option of improving efficiency of farmers by improving on their condition or removing existing institutional, market and socio-economic constraints and introduction of improved technologies.

For more than a decade, it was thought that adopting food import as a policy would address the nation's food shortage problem. However it has become obvious that such policy rather than bring solutions, has fuelled inflation, discouraged local production and created poverty among many farm households and helped to cause food insecurity. This therefore necessitated alternative policy actions. Consequently, speedy and extensive introduction of technological change has become one of the crucial concerns in the development of Nigeria's agriculture (International Development Research Centre (IDRC), 2005). Much effort has been geared towards increasing the availability and adoption of improved technologies in maize production in Nigeria both at the National and State levels. Specifically, the federal government in 2006 initiated a programme of doubling maize production in Nigeria through promotion of improved production technologies such as fertilizer, hybrid seeds, pesticides, herbicides and better management practices. Several improved maize varieties that are drought-tolerant, low nitrogen-tolerant, Striga-tolerant, stemborer-resistant and early maturing has been deployed to address the challenge faced by resource-poor farmers in maize production. Despite these efforts, maize productivity remained low thus raising question about the efficiency with which resources are used by maize farmers. More, importantly, for a justification of further investment in agricultural production and technology development in general and maize in particular, there is a need to assess the feasibility of investment made so far.

It is against this background that this study analyses the technical, allocative and cost efficiency of smallholder maize production and evaluates the impact of technological innovations on these efficiency measures. To the best of my knowledge, no previous study has been conducted on simultaneous analysis of technical, allocative and cost efficiency of the maize sub-sector in Nigeria. Different approaches exist for efficiency analysis and different approaches may produce different results leading to different policy conclusions. However, if different approaches give similar results, it implies that the measures of efficiency and the explanations of relative efficiency in terms of the variables of interest (for instance technological innovation and other policy variables as in this study) can be used as basis for policy recommendations. Two competing broad approaches are usually employed in efficiency analysis namely parametric and non-parametric approaches with each having both advantages and disadvantages. While there are a number of parametric approaches, the data

envelopment analysis has dominated the non-parametric approach. The choice between the various variants of these two approaches has been an issue of debate with some preferring the parametric approach while others prefer the non-parametric approach. Even within the parametric approach, a choice needs to be made whether to employ a production or distance or cost frontier especially when the analysis extends beyond technical efficiency to allocative and cost or economic efficiency.

The traditional approach in using a parametric frontier for analyzing allocative and cost efficiency is to specify the production technology either as a production or cost function. The problem with the direct estimation of cost frontiers is that it will not be practical when input prices do not differ among firms, a case that is very common in developing country agriculture. It will also not be appropriate when there is systematic deviation from cost-minimising behaviour. In this situation, the duality between the cost and production functions breaks down, and the resulting bias in the cost frontier estimates will make the cost efficiency calculation and decomposition biased as well (Bauer, 1990; Coelli et al., 2003). The problem with the production frontier (e.g. Bravo-Ureta and Riegger, 1991) approach is that a production function is estimated when one is clearly assuming that the input quantities are decision variables thus leaving the approach to criticism that simultaneous equation bias may afflict the production frontier, and efficiency estimates may be biased (Coelli et al., 2003; Alene and Hassan, 2005). The problems with the conventional cost and production frontiers motivate interest in distance functions. The distance function approach does not require behavioural assumptions to provide a valid representation of the underlying production technology, does not suffer from simultaneous equations bias when firms are cost minimisers or shadow cost minimisers, easily accommodates multiple outputs and does not require variation in input prices across firms to provide valid estimates of allocative and cost efficiency. This study contributes to the understanding of the sensitivity of efficiency results to the methodological approach employed using the Nigerian maize sector as a case study.

The present study is by no means the first to investigate the sensitivity of efficiency estimates to parametric and non-parametric approaches. However, the sensitivity of results to analytical approaches has not been fully explored and results from different studies have been mixed. For instance, most studies compared efficiency scores from

the parametric stochastic frontier production function (SFPF) and data envelopment analysis (DEA) which is non-parametric (e.g., Ferrier and Lovell, 1990; Kalaitzandonakes and Dunn, 1995; Sharma et al., 1997,1999; Wadud and White, 2000; Mbagu et al. 2000; Bojnec and Latruffe, 2007; Ajibefun, 2008). The parametric stochastic production frontier approach however has been critiqued for simultaneity bias especially when analysis extends to that of allocative and cost or economic efficiency. Few studies have compared results from parametric distance functions to other approaches (Coelli and Perelman, 1999; Alene and Manfred, 2005; Alene et al. 2006). These studies compared technical efficiency estimates only and none of the approaches accounted for the possible stochastic noise in the data. In other words, the parametric distance functions employed were deterministic in nature. Further, with exception of few comparative studies (Coelli and Perelman, 1999; Alene et al. 2006, Azadeh et al. 2009) which provided a method for calculating final efficiency scores and ranks of the units studied, majority simply calculated the correlation between efficiency scores from different approaches. Even these few studies limited their analysis to obtaining final technical efficiency scores without consideration of overall efficiency and determinants and Alene et al. (2006) is the only study related to agriculture.

Few studies (Umeh and Asogwa 2005; Chirwa, 2007; Oyekale and Idjesa, 2009) attempted analyzing the impact of technology on technical efficiency without due consideration to allocative and cost efficiency. More so, the sensitivity of impact to methodological approach and the selectivity bias and thus potential endogeneity of adoption decisions was not considered in these studies. The current study fills these knowledge gaps by employing a parametric stochastic frontier input distance function (SIDF) approach that accounts for stochastic noise and avoids simultaneity bias and compares the results to the non-parametric counterpart, that is, the input oriented data envelopment analysis, DEA. Also a comparison is made with the conventional SFPF approach. The sensitivity of technical, allocative and cost efficiency estimates and their determinants from these approaches is analysed. Based on the consistency of efficiency results from the different approaches, an integrated model is developed to obtain final efficiency scores and for policy analysis. To illustrate the potentialities of this approach, application is made to analysis of technology and other policy impact on technical, allocative and cost efficiency in the maize sector of Nigeria with the aim

of providing the direction and magnitude of impact. To the best of my knowledge, no previous study has taken similar dimension both in terms of content and comprehensiveness as proposed in this study.

1.3 Objectives of the Study

The broad objective of this study is to evaluate the sensitivity of efficiency results estimated from both parametric and non-parametric frontier approaches with application to Nigeria's maize sector. The specific objectives are to:

- (1) compare the performance of technical, allocative and cost efficiency measures from both parametric stochastic and non-parametric distance functions;
- (2) assess the impact of measuring technical, allocative and cost efficiency relative to a distance function frontier versus a production function frontier;
- (3) analyse and compare the effect of technology and other policy variables on technical, allocative and cost efficiency of maize farmers in Benue State Nigeria using results from the different frontier models;
- (4) integrate technical, allocative and cost efficiency scores from different frontier models into a single index of technical, allocative and cost efficiency respectively and subsequently analyse the impact of technology and other policy variables on these combined scores.

1.4 Hypotheses

The following hypotheses were tested in the study.

- (1) Technical, allocative and cost efficiency scores from both parametric and non-parametric approaches are similar with respect to their means.
- (2) TE, AE and CE scores from both parametric and non-parametric approaches are similar with respect to their distributions.
- (3) TE, AE and CE scores from both parametric and non-parametric approaches are similar with respect to their variances.
- (4) TE, AE and CE scores from both parametric and non-parametric approaches are similar with respect to their rankings of farm households.

1.5 Justification for the Study

This study is motivated by the important position of maize production in the Nigerian economy. Maize production not only serves as an important food staple to a majority of the citizens of Nigeria but also a source of revenue to both farm households and the nation at large. Nigeria has a great potential for better economic growth both in the short and long run than is currently experienced through increased maize production. Therefore, the need to efficiently allocate productive resources for development purposes cannot be overstressed. In that case, every resource should be efficiently and effectively mobilized to reduce the gap between actual and potential national output. But most importantly is to ensure that the nation's concerted effort to improving agricultural technology is remunerated with sufficient gains in food security and economic growth since technologies are developed, disseminated and adopted at a cost. Given the comparative nature of this study, the outcome in terms of the consistency or otherwise of the results will form a basis for policy recommendations. Thus, the study will contribute to literature on economic efficiency in the context of appropriate analytical methodology to employ. Measurement of efficiency is justified for a number of reasons: firstly, it is an indicator of performance measure by which production units are evaluated, thus indicating the potentials there is to improve productivity and household welfare by improving efficiency. Therefore, knowledge of production efficiency will assist policy makers to identify which farmers need support most, thus assisting in better targeting and priority setting. Secondly, measurement of causes of inefficiency makes it possible to explore the sources of efficiency differentials and elimination of causes of inefficiency. Finally identification of sources of inefficiency indicates which aspect of the farm's physical and human resources need to be targeted by public investment to improve performance.

This study is further justified, as it will help the research and extension agents to know specifically the various problems faced by the farmers and how best to ensure that their production potentials are realized by facilitating technology generation and diffusion thus reducing production inefficiencies. The farmers themselves will also benefit from this study as the revelation of their true situation could attract more favourable policies to them, which will help in improving their access to the modern technologies and thus increasing their productivity and efficiency. As there is a dearth

of empirical work explicitly linking efficiency and agricultural technologies, this study will therefore contribute to the existing literatures not simply by testing the difference in the mean efficiency of users and non-users of improved technologies but also by determining the direction and magnitude of impact of such adoption decisions on farmers' technical, allocative and cost efficiency and also the sensitivity of such impact to different methodological approach. Finally, the building of an integrated model will serve as an important tool to production economists and agricultural policy analysts as this is expected to ease the problem of model selection for efficiency and policy analysis.

1.6 Organization of the Thesis

The thesis is organized into eight chapters. The next chapter (chapter two) presents an overview of agricultural policies and programmes in Nigeria. Chapter three gives a detailed account of theoretical and empirical issues relating to technical, allocative and cost efficiency. In chapter three, the review of empirical studies is limited to comparative studies in agriculture, comparative studies in other sectors that employed distance functions in efficiency analysis and efficiency studies in Nigerian agriculture. This is because of the large volume of theoretical and empirical literature in the field of efficiency measurement and it will help in giving the study a proper focus. The analytical framework and empirical specifications for the alternative approaches are discussed in chapter four. Chapter five describes the study area, sampling procedures, data and socioeconomic characteristics of sampled households. Chapter six is dedicated to discussion of results from different approaches and their comparison. The integrated model and results from the model is discussed in chapter seven. Chapter eight provides a summary of the research problem, study approach, main findings and policy implications, limitations of the study and recommendations or scope for further research.

CHAPTER 2

A REVIEW OF AGRICULTURAL POLICIES AND PROGRAMMES IN NIGERIA

2.1 Introduction

Agricultural policy is the combination of the outline and strategies designed to achieve overall agricultural development and growth. Agricultural development refers to the process of making fuller and more rational the use of agricultural resources of a country, with a special reference to improving the efficiency of agriculture and the living standards of the agricultural population (FAO 1953 cited in Famoriyo and Raza, 1982). Agricultural policies and programmes can be evaluated by their ability to promote not only agricultural development but also overall economic growth, the capacity to bring about structural transformations and their poverty reducing impacts. Farmers are generally confronted with many risks and uncertainties ranging from weather, drought, floods, fire, diseases and pest, unstable market conditions, falling product prices and constant increase in the prices of production inputs among others. These risks in the production and socioeconomic environment in which farmers operate make it very essential to make deliberate developmental efforts to prevent agricultural productivity from declining or remaining static and promote agricultural development in general.

The Nigerian government has made several developmental efforts aimed at improving the performance of the agricultural sector. The national policy on agriculture can be viewed either as a process or as an output (or product) or both. Viewed as an output, the national policy on agriculture becomes roughly equivalent to the national policy statement(s) on agriculture. These statements are usually contained in government publications and documents. An agricultural policy statement usually consists of the objectives, the strategies for their realization, and the operational targets for measuring performance (Oji, 2002). The policy documents identifies the ultimate goal of Nigerian Agricultural Policy as the attainment of self-sustaining growth in all the sub-sectors of agriculture as well as the realization of the structural transformations

necessary for the overall socio-economic development of the rural areas. Viewed as a process, the national policy on agriculture reflects the cumulative experiences and lessons learned from implementing various policies in the agriculture sector right from the nation's independence in 1960 (Igbokwe et al., 2004).

The purpose of this chapter is to present an overview of the agricultural policy and programmes in Nigeria and their impact on agricultural productivity and development. The next section provides a review of agricultural policies and programmes in Nigeria. The third section evaluates the impact of development strategies on agriculture's performance. The last section concludes by providing a summary.

2.2 Agricultural Policy and Programmes in Nigeria

Since Nigeria's independence in 1960, successive governments as well as international donors, bilateral and multilateral agencies have designed and implemented different agricultural policies and programmes. The agricultural policies and strategies adopted in Nigeria since independence are discussed under four distinct periods. These include the pre-1970 era, the period 1970-1985, the period 1986-1999, and post 1999 era.

2.2.1 The Pre-1970 Era

The pre-1970 era was characterized by minimum direct government intervention in agriculture. As such, government's attitude to agriculture was relaxed, with the private sector and particularly the millions of small traditional farmers bearing the brunt of agricultural development efforts. Government efforts were merely supportive of the activities of these farmers and these largely took the form of agricultural research, extension, export crop marketing and pricing activities. Most of these activities were regional-based towards the end of the colonial era with federal government's contribution being confined largely to agricultural research. The low visibility of governments in agricultural development efforts was borne out of a general philosophy of economic *laissez faire*. Some governments were bent on making their presence felt in agriculture, especially in the 1950s and 1960s, by

creating government-owned agricultural development corporations and launching farm settlement schemes. But these actions found their justification more in welfare considerations than in hard-core economic necessities (Manyong et al., 2003).

The first National Development Plan for the years 1962-68 was enacted during this era. This Development Plan was aimed at exploiting the abundant natural resources for improvement of the living standards and GDP growth target was set at 4 percent per annum (Federal Ministry of Economic Development, 1963). However, the share of investment to the primary sector was only 13.6 percent whereas the shares of industries, electricity, and the transportation system added up to 50 percent (Shimada, 1999). This development plan focused mainly on infrastructure provisions and it was designed such that regional governments would also implement their own development plans in addition to that of the federal government. During this period, much emphasis was laid on export crops through research, extension, subsidies and export-crop marketing and development programmes for cocoa, groundnut and palm produce. Little attention was given to food crop production.

By the end of the 1960s, it became obvious that the Nigerian agricultural economy was heading towards big catastrophe. Signs of emerging agricultural problems included declining export crop production and some mild food shortages. Even then, most of these problems were attributed to the civil war and as such, were considered to be only ephemeral in nature. But events soon proved these optimistic assumptions wrong as the agricultural sector sank deeper and its problems became much more intractable than anticipated (Manyong et al., 2003).

2.2.2 The 1970-1985 Era

The second era, 1970-1985, is the period spanning the post-civil war years to the era just before economic adjustment, and it was characterized by change from minimum intervention, to that of active intervention and programming. This phase witnessed massive government involvement in all facets of agricultural production. The feeling was pervasive that the solutions to the increasingly serious problems of agriculture and especially those of food supply required the heavy clout of government in the form of multi-dimensional agricultural policies, programs and projects, some of them

requiring the direct involvement of government in agricultural production activities. The sudden smile of oil fortune on Nigeria reinforced this feeling (Manyong et al., 2003). Hence, the decade of the 1970s and early 1980s witnessed an unprecedented deluge of agricultural policies, programs, projects and institutions. Direct and indirect agricultural interventions were implemented with public resources from oil earnings.

During this period, the second National Development Plan for the years 1970/71-1973/74 was enacted. The main aim of this development plan was to restore the economy damaged by the war, and agriculture was still its utmost priority. However, again the budgetary share for agriculture was only 10.5 percent, and the expenditure realized was 7.7 percent of the total (Federal Ministry of Economic Development, 1975; Shimada 1999). Within the agricultural sector itself, the emphasis was on restoration of export crop production, and the food-producing sector attracted only little attention. The food shortages which resulted from the Biafran war and subsequent effects of the 1972-74 droughts destabilized the optimistic view on agriculture that was prevalent in the 1960s. Imminent crisis was felt, but no action was taken. The government chose to rely on imports of maize, wheat, and rice, rather than to address measures to strengthen food production (Shimada, 1999).

In 1974, the National Accelerated Food Production Project (NAFPP) was initiated and it was aimed at increasing the production of rice, maize, millet, sorghum, cassava, and wheat. The program assisted supply of improved seeds, chemical fertilizers, and pesticides, education of farmers, sales of agricultural products, and stock management and processing. Agro Service Centres were built all around the country to ensure effective service delivery to the public. However, these services failed to provide agricultural inputs at the right time, and before it could achieve any substantial results, the main constituents were transferred to the Agricultural Development Project (ADP) in 1975 (Okuneye, 1992, Shimada, 1999). The ADP was set up in all states of the federation to help organize farmers into more productive agriculture through the provision of modern inputs. It however, included more comprehensive measures in addition to the provision of agricultural inputs, such as construction of agricultural roads, building of small-scale dams, and setting up of Agro Service Centres. At the end of 1985, there were 470 Agro Service Centres all over the country (Okuneye, 1992).

During this era, other programmes aimed at boosting food production were also in place. These include Operation Feed the Nation (OFN) and the Green Revolution Scheme. These projects were innovative in the history of Nigerian agricultural policy in that they proved a shift of the government's attitude toward active participation in food production. The OFN was actively advertised to public, using mass media, and was substantially implemented. The aim of the project was to build a stable and self-sufficient socio-economic system by increasing food production to the level sufficient to feed the growing population, and to lower the import dependency ratios. Thus, not only the farmers but all citizens were called for co-operation. Distribution of fertilizers and improved breeds, extermination of insects and diseases, and lending of agricultural tools and machines were pursued not only by farmers but also by all citizens, including military men and civil servants. Mobilization of university and polytechnic students in farming during the summer vacation was also pursued.

In October, 1979, there was a change from military government to a democratic one which led to the election of Shehu Shagari as the president of Nigeria and the Fourth National Development Plan (1981-1985) was enacted thereafter. The scale of this plan with a total budget of 70,500,000,000 Naira reflected the oil revenues of the late 1970s. The plan aimed at improvement in real earnings, equality in income distribution, lowering of unemployment and under-employment rates, increased skilled labour, diversified economic activities, growth with equality among regions and sectors, and strengthened self-sufficiency of the economy by utilizing domestic resources more efficiently. The agricultural sector and the agricultural processing sector were designated as the first priorities for development, and the largest share of budget, 13.1 percent (9,260,000,000 Naira) was allocated to the agricultural sector (Federal Ministry of National Planning (undated) cited in Shimada, 1999).

Regardless of the OFN, the food shortage in Nigeria worsened. To counteract this situation, the government additionally set out the Green Revolution Plan Scheme in 1980. Improved rural road and education facilities were election promises of the National Party of Nigeria (NPN) led by President Shagari (Udo, 1982). Thus, the abolition of the OFN and the enactment of the Green Revolution were not merely about a change in agricultural development policy but also a reflection of political matters (Shimada, 1999). The scheme was set up to encourage all Nigerians in both

urban and rural areas to go into agriculture for both commercial purposes and provision of food for home consumption. This scheme aimed to achieve self-sufficiency in food provision by 1985, when the Fourth National Development Plan terminated. For this goal, the scheme emphasized the need for comprehensive development of the rural areas. Thus emphasis was not only on food production, but also on building food processing firms, developing rural roads, providing houses, improving education and health facilities, and installation of water and electricity systems. Given the much dependency on imported inputs and foreign direction in irrigation projects that prevailed prior to this period, the scheme emphasized that dependency on foreign powers should be avoided as much as possible in terms of both manpower and technology. There are doubts about the impact of these programmes or schemes. They failed as efforts aimed at developing the agriculture sector. For instance, the green revolution led to increasing inequality in the rural areas whereby larger landowners became richer while the poorer farmers who produce the bulk of Nigeria's food needs were disadvantaged (Famoriyo and Raza 1982; Shimada, 1999; Manyong et al., 2003).

2.2.3 The 1986-1999 Era

The failure of the state led approach to development, Nigeria's declining fortune in the petroleum export market, an escalating debt burden and an unhealthy investment climate led to the realization that the country's economy required some drastic restructuring. These gave impetus to the structural adjustment program (SAP) launched in July 1986. A structural adjustment program comprises a mix of demand-side policies, supply-side policies and other policies designed to improve a country's international competitiveness. Generally, structural adjustment policies in Nigeria were aimed not only at correcting existing price distortions in the economy but also structural imbalances and for promoting non-price factors which would enhance the effectiveness of price factors (Manyong et al., 2003). The SAP period was characterised by contracting fiscal policies, deregulatory monetary and exchange rate policies, institutional restructuring and government divestiture from direct agricultural production and marketing.

According to Manyong et al. (2003), structural adjustment policies in Nigeria could be categorized into four broad groups. In the first group were expenditure reducing or demand-management policies, which were designed to influence the economy's aggregate domestic absorption mainly through fiscal and monetary policy instruments. The second group included expenditure switching policies that were designed to alter domestic relative prices in favour of tradable commodities and improve the price competitiveness of export commodities and import -competing goods. The most important policy instrument for this was the devaluation of the national currency. Thirdly, there were market liberalization policies that were designed to give the free interplay of market forces more roles in the economy, reduce administrative controls as well as government intervention in the operation of the economy and, generally, render the economy more flexible and more resilient. Policy instruments required for these included those aimed at reducing import and export taxes, eliminating export and import prohibitions, relaxing input and output marketing controls, withdrawal of subsidies and price controls, and so on. Fourthly, there were institutional or structural policies that were designed to eliminate those structural constraints that tended to inhibit the effectiveness of other adjustment policies. Some major structural policy instruments were those designed to promote the flow of technological innovation, provide better input delivery systems, provide more infrastructure and utilities, improve national information systems, provide institutional framework for the smooth operation of free market system and, generally, create a more favourable environment for increased investment in the economy, efficient allocation of resources and enhanced profitability of public enterprises through commercialization and privatization.

With respect to the agricultural sector under SAP, the tariff structure was adjusted to encourage local production and to protect agricultural and local industries from unfair international competition. The marketing boards for scheduled crops were abolished. Bans were placed on the importation of a number of food items including most livestock products, rice, maize, wheat and vegetable oils. Subsidies for agricultural input subsidies were substantially cut. For instance, in the first half of the 1980s, the retail prices of fertilizers and pesticides were only 25 percent and 20 percent of real prices, respectively. The subsidizing rate for fertilizers, for example, was dropped from 75 percent to 60 percent (CBN, 1992). A number of new institutions were

created for agricultural and rural development namely; the Directorate of Food, Roads and Rural Infrastructure (DFRRI) and the National Directorate of Employment (NDE). Some existing institutions were also reorganised (e.g. the River Basin Development Authorities), while most public-owned agricultural enterprises were privatised or commercialized (Federal Ministry of Agriculture and Rural Development (FMARD), 2001).

Following SAP, the economic philosophy of the government for the agricultural sector are the key principles that (i) agriculture is essentially a private-sector activity, and the role of government must largely be facilitating and supportive of private-sector initiative; (ii) the agricultural economy should be as free of government administrative control as possible, as market forces are allowed to play a leading role in directing the economy and resource allocation; (iii) the agricultural economy should be more inward-looking and self-reliant by depending more on local resources, and at the same time ensuring self-sufficiency in food production and the supply of raw-materials to industries; (iv) the agricultural economy should serve as the primary avenue for the diversification of the export base of the economy. (v) the agricultural economy should provide the take-off and serve as the engine room for growth and development in the economy (Igbokwe et al., 2004).

According to FMARD (2001), these SAP measures to some extent had positive impact on the agricultural sector due mainly to price increase as a result of devaluation of the currency and ban on importation of wheat, rice and maize. The ban placed on the importation of some food items increased the output of local production, especially rice. However poultry and fishery production became less profitable because of the resultant exorbitant costs of imported inputs attendant on SAP. Sharp rises in imported inputs such as fertilizer, agro-chemicals etc. were also witnessed while the cost of providing large scale irrigation rose because of the high cost of foreign components. The increase in the cost of the import component of equipment for research and technology development reduced their further growth. Although SAP substantially addressed problems of price distortions to the farmers, new problems were created by the effects of the changes in macro-economic policies. Implementation bottlenecks arising from scarcity of basic farm inputs and slower rate of adoption of new technologies also contributed their quota in impeding the

achievement of policy objectives. These reduced the expected benefits of yield increases accruable from the adoption and use of modern farm inputs such as improved variety of seeds. The withdrawal of subsidies which increased production costs substantially reduced the profitability of agricultural activities leading to reduction in size of farm holdings and enterprises. The problem of inefficient marketing persisted as a result of existence of imperfection in the markets, dwindling marketing infrastructures and limited availability of storage facilities.

In 1988, the first national policy on agriculture was adopted and was expected to remain valid up to the year 2000. The document, Agricultural Policy for Nigeria, released by FMARD (1988), itemized seven broad agricultural policy objectives along with their accompanying strategies for realization. The seven broad policy objectives include: (i) attainment of self-sufficiency in basic food commodities with particular reference to those which consume considerable shares of Nigeria's foreign exchange and for which the country has comparative advantage in local production; (ii) increase in production of agricultural raw materials to meet the growth of an expanding industrial sector; (iii) increase in production and processing of exportable commodities with a view to increasing their foreign exchange earning capacity and further diversifying the country's export base and sources of foreign exchange earnings; (iv) modernization of agricultural production, processing, storage and distribution through the infusion of improved technologies and management so that agriculture can be more responsive to the demands of other sectors of the Nigerian economy; (v) creation of more agricultural and rural employment opportunities to increase the income of farmers and rural dwellers and to productively absorb an increasing labour force in the nation; (vi) protection and improvement of agricultural land resources and preservation of the environment for sustainable agricultural production; (vii) establishment of appropriate institutions and creation of administrative organs to facilitate the integrated development and realization of the country's agricultural potentials.

The main features of the policy include the evolution of strategies that will ensure self-sufficiency and the improvement of the level of technical and economic efficiency in food production. This was to be achieved through the introduction and adoption of improved seeds and seed stock, husbandry and appropriate machinery and

equipment, efficient utilization of resources, encouragement of ecological specialisation and recognition of the roles and potentials of small scale farmers as the major producers of food in the country. Reduction in risks and uncertainties were to be achieved through the introduction of the agricultural insurance scheme to reduce natural hazard factors militating against agricultural production and security of credit outlay through indemnity of sustained losses. A nationwide, unified and all-inclusive extension delivery system under the ADP was put in place in a joint federal and state government collaborative effort. Agro- allied industries were actively promoted. Other incentives such as rural infrastructure, rural banking, primary health care, cottage industries etc. were provided, to encourage agricultural and rural development and attract youth, including school leavers, to go back to the land.

The agricultural policy was supported by sub-policies aimed at facilitating the growth of the sector. These sub-policies covered issues of labour, capital and land whose prices affect profitability of production systems; crops, fisheries, livestock and land use; input supply, pest control and mechanisation; water resources and rural infrastructure; agricultural extension, research, technology development and transfer; agricultural produce storage, processing, marketing, credit and insurance; cooperatives, training and manpower development, agricultural statistics and information management. Implementation of the agricultural policy was however, moderated by the macro-economic policies which provide the enabling environment for agriculture to grow along side with the other sectors. These policies usually have major impact on profitability of the agricultural system and the welfare of farmers as they affect the flow of funds to the sector in terms of budgetary allocation, credit, subsidies, taxes etc and, therefore, must be in harmony and mutually reinforcing with the agricultural policy. The macro policies comprise the fiscal, monetary, trade, budgetary policies and other policies that govern macro-prices.

The experience gained over the years in the implementation of the agricultural policy and the trends in agricultural development during this era lead to the formulation of a number of sub-sectoral policies which include the Land Resources Policy which is expected to guide the sustainable use of agricultural lands, National Agricultural Mechanisation Policy, National Cooperative Development Policy, and the National Seed Policy which assigns primary responsibility for commercial seed supply to the

private sector while Government was responsible for foundation and breeder seed development, seed certification and quality control and certification while providing the enabling environment for the seed industry development. The National Policy on Integrated Rural Development was also formulated and was expected to integrate the rural economy into the mainstream of national development process to ensure its effective coordination and management and make the rural areas more in tune with the urban areas so as to moderate the rural-urban drift, redress the past neglect through provision of critical rural infrastructure and empowerment of the rural population to create wealth and eradicate rural poverty (FMARD, 2001).

In view of the fact that agricultural and rural development is critical for generating economic growth, institutional arrangements were also adopted for realising sector objectives (FMARD, 2001). These include the relocation of the Department of Cooperatives of the Ministry of Labour and its merger with the Agricultural Cooperatives Division of the Ministry of Agriculture, the transfer of the Department of Rural Development from the Ministry of Water Resources to the Ministry of Agriculture; the scrapping of the erstwhile National Agricultural Land Development Authority (NALDA) and, the merging of its functions with the Rural Development Department; scrapping of the Federal Agricultural Coordinating Unit (FACU) and the Agricultural Projects Monitoring and Evaluation Unit (APMEU) and the setting up of Projects Coordinating Unit (PCU) and streamlining of institutions for agricultural credit delivery with the emergence of the Nigerian Agricultural, Cooperative and Rural Development Bank (NACRDB) from the erstwhile Nigerian Agricultural and Cooperative Bank (NACB) and the Peoples Bank and the assets of the Family Economic Advancement Programme (FEAP).

2.2.4 The Post 1999 Era

The federal government under the leadership of President Olusegun Obasanjo critically evaluated the 1988 agricultural policy in 2001; an evaluation which led to the approval of its latest policy entitled “The New Policy Thrust for Agriculture” in 2002 (FMARD, 2001; FRN, 2002). The new policy document share very similar features to that of 1988. However, this new policy thrust provided greater support for the underlying philosophy of allowing the private sector and market forces to dictate

the pace of development in the agriculture sector, while governments at all levels are restricted to facilitating roles, support services, and providing the enabling environments for agricultural growth. In a broad sense, the objectives of the new agricultural policy are very similar to those of the old one. They include: (i) The achievement of self-sufficiency in basic food supply and the attainment of food security; (ii) increased production of agricultural raw materials for industries; (iii) Increased production and processing of export crops, using improved production and processing technologies; (iv) generating gainful employment; (v) rational utilization of agricultural resources, improved protection of agricultural land resources from drought, desert encroachment, soil erosion and flood, and the general preservation of the environment for the sustainability of agricultural production; (vi) promotion of the increased application of modern technology to agricultural production; and, (vii) improvement in the quality of life of rural dwellers.

The key features of the new policy are as follows: (i) Evolution of strategies that will ensure self-sufficiency and improvement in the level of technical and economic efficiency in food production. This is to be achieved through (i) the introduction and adoption of improved seeds and seed stock; (ii) adoption of improved husbandry and appropriate machinery and equipment; (iii) efficient utilization of resources; (iv) encouragement of ecological specialization; and (v) recognition of the roles and potentials of small -scale farmers as the major producers of food in the country; (vi) reduction of risks and uncertainties in agriculture, to be achieved through the introduction of a more comprehensive agricultural insurance scheme to reduce the natural hazard factors militating against agricultural production and security of investment; (vii) a nationwide, unified and all-inclusive extension delivery system under the ADPs; (viii) active promotion of agro-allied industry to strengthen the linkage effect of agriculture on the economy; (ix) provision of such facilities and incentives as rural infrastructure, rural banking, primary health care, cottage industries etc, to encourage agricultural and rural development and attract youths (including school leavers) to go back to the land.

The major content of the new policies include (i) agricultural resources (land, labour, capital, seeds, fertilizer, etc) whose supply and prices affect the profitability of agricultural business; (ii) crops, livestock, fisheries and agro-forestry production; (iii)

pest control; (iv) mechanization; (v) water resources and irrigation; (vi) rural infrastructure; (vii) agricultural extension and technology transfer; (viii) research and development (R&D); (ix) agricultural commodity storage, processing and marketing; (x) credit supply; (xi) insurance; (xii) agricultural cooperatives; (xiii) training and manpower development and (xiv) agricultural statistics and information management.

According to the document (FMARD, 2001; FRN, 2002), the new agricultural policy will herald in a new policy direction via new policy strategies that will lay the foundation for sustained improvement in agricultural productivity and output. The new strategies involve: (i) creating a more conducive macro-environment to stimulate greater private sector investment in agriculture; (ii) rationalizing the roles of the tiers of government and the private sector in their promotional and supportive efforts to stimulate agricultural growth; (iii) reorganizing the institutional framework for government intervention in the agricultural sector to facilitate the smooth and integrated development of the sector; (iv) articulating and implementing integrated rural development programs to raise the quality of life of the rural people; (v) increasing budgetary allocation and other fiscal incentives to agriculture and promoting the necessary developmental, supportive and service-oriented activities to enhance agricultural productivity, production and market opportunities and (vi) rectifying import tariff anomalies in respect of agricultural products and promoting the increased use of agricultural machinery and inputs through favourable tariff policy.

The new agricultural policy spelt out definitive roles and responsibilities for the federal, state and local governments as well as the private sector in order to remove role duplication and overlapping functions among them. Under the new policy regime, the federal government are responsible for: (i) the provision of a general policy framework, including macroeconomic policies for agricultural and rural development and for the guidance of all stakeholders; (ii) maintenance of a reasonable flow of resources into agriculture and the rural economy; (iii) support for rural infrastructure development in collaboration with state and local governments; (iv) research and development of appropriate technology for agriculture, including biotechnology; (v) seed industry development, seed law enforcement and seed quality control; (vi) support for input supply and distribution, including seeds, seedlings,

brood stock and fingerlings; (vii) continued support for agricultural extension services; (viii) management of impounded water, supervision of large dams and irrigation canals and maintenance of pumping facilities; (ix) control of pests and diseases of national and international significance and the promotion of integrated disease and pest management; (x) establishment and maintenance of virile national and international animal and plant quarantine services; (xi) maintenance of favourable tariff regime for agricultural commodities; (xii) promotion of the export of agricultural commodities through, among others, the Export Processing Zones (EPZs); (xiii) establishment of an agricultural insurance scheme; (xiv) maintenance of a Strategic National Grain Reserve for national food security; (xv) coordination of agricultural data and information management systems; (xvi) inventorization of land resources and control of land use and land degradation; (xvii) training and manpower development; (xviii) participation in the mapping and development of interstate cattle and grazing routes and watering points; (xix) promotion of micro-and rural credit institutions; (xx) promotion of agricultural commodity development and marketing institutions; (xxi) maintenance of fishing terminals and other fisheries infrastructure, including cold rooms; (xxii) promotion of trawling, artisanal and aquaculture fisheries; (xxiii) promotion of fish feed production; (xxiv) protection of Nigeria's Exclusive Economic Zone for fisheries resources and (xxv) periodic review of agreements on international agricultural trade.

The state governments are primarily responsible for: (i) the promotion of the primary production of all agricultural commodities through the provision of a virile and effective extension service; (ii) promotion of the production of inputs for crops, livestock, fish and forestry; (iii) ensuring access to land for all those wishing to engage in farming; (iv) development and management of irrigation facilities and dams; (v) grazing reserve development and creation of water access for livestock; (vi) training and manpower development; (vii) control of plant and animal pests and diseases; (viii) promotion of appropriate institutions for administering credit to smallholder farmers; (ix) maintenance of buffer stocks of agricultural commodities; (x) investment in rural infrastructure, including rural roads and water supply in collaboration with federal and local governments and (xi) ownership, management and control of forest estates held in trust for local communities.

The local governments are expected to take over progressively the responsibilities of state governments with respect to: (i) the provision of effective extension service; (ii) provision of rural infrastructure to complement federal and state governments' efforts; (iii) management of irrigation areas of dams; (iv) mobilization of farmers for accelerated agricultural and rural development through cooperative organizations, local institutions and communities; (v) provision of land for new entrants into farming in accordance with the provision of the Land Use Act and (vi) coordination of data collection at primary levels.

According to the policy document, since agricultural production, processing, storage and marketing are essentially private sector activities; the role of the private sector was to take advantage of the improved enabling environment provided by the public sector for profitable agricultural investment. In particular, the public sector is expected to play a leading role with respect to: (i) investment in all aspects of upstream and downstream agricultural enterprises and agribusinesses, including agricultural commodity storage, processing and marketing; (ii) agricultural input supply and distribution; (iii) the production of commercial seeds, seedlings, brood stock and fingerlings under government certification and quality control; (iv) agricultural mechanization; (v) provision of enterprise-specific rural infrastructure and (vi) support for research in all aspects of agriculture.

Following the redefined roles and responsibilities of tiers of government and the private sector, the main thrust of federal government programs and activities are directed at obviating the technical and structural problems of agriculture. These include research and development, (including biotechnology development), animal vaccine production, veterinary drug manufacture, agro-chemicals manufacture, water management, adaptive technology promotion, and the creation and operation of an Agricultural Development Fund. Supportive activities under the new policy comprise input incentive support and commodity marketing and export activities, support delivery activities cover input supply and distribution, agricultural extension, micro-credit delivery, cooperatives and farmer/commodity associations, commodity processing and storage, agro-allied industry and rural enterprise development, and export promotion of agricultural and agro-industrial products. For instance in the case of input supply and distribution the government is expected to create a more

conducive environment for profitable investments in the production and distribution of inputs such as improved starter materials, animal health drugs, fertilizers, etc. Fertilizer supply is hinged on complete privatization and liberalization in the production, distribution and marketing of the commodity. The main role of the government therefore is to strictly monitor the quality standard of all fertilizers (both local and foreign) to ensure that only certified products reach the farmer. Government is also expected to encourage the use of organic fertilizers to complement the inorganic fertilizers currently in use. The seed industry development program is expected to be reinvigorated and community seed development programs promoted to ensure the provision of adequate and good quality seeds to local farmers. The organised private sector is to be mobilized, encouraged and given incentives to actively participate in the production of seeds, seedlings, brood stock, fingerlings, etc, and also to be involved in out-growers mobilization.

The successful implementation of the agricultural policy is, however, contingent upon the existence of appropriate macroeconomic policies that provide the enabling environment for agriculture to grow in equilibrium with other sectors. They affect profitability of agricultural enterprises and the welfare of farmers through their effects on the flow of credit and investment funds, taxes, tariffs, subsidies, budgetary allocation, etc. A range of macroeconomic and institutional policies as well as legal framework that affect agricultural investment in particular and agricultural performance in general was therefore considered under the new policy. The policies broadly cover fiscal, monetary and trade measures. There is also a large body of institutional policies that support not only the implementation of macroeconomic policies but also that of agricultural sector policies. Then, there is a set of national and international legal framework, including bilateral and multilateral agreements and treaties that provide the enabling environment for foreign and domestic private investment, promote international trade and, therefore, promote economic growth.

One of the important policies which is of interest to this study is the environmental policy. The goals of National Policy on the Environment is to achieve sustainable development in Nigeria, and, in particular, to (i) secure a quality of environment adequate for good health and well being; (ii) conserve and use the environment and natural resources for the benefit of present and future generations; (iii) restore,

maintain and enhance the ecosystems and ecological processes essential for the functioning of the biosphere to preserve biological diversity and the principle of optimum sustainable yield in the use of living natural resources and ecosystems; (iv) raise public awareness and promote understanding of the essential linkages between the environment, resources and development, and encourage individual and community participation in environmental improvement efforts; and (v) co-operate in good faith with other countries, international organisations and agencies to achieve optimal use of trans-boundary natural resources and for an effective prevention or abatement of trans-boundary environmental degradation.

In recognition of several longstanding challenges facing Nigeria which includes the fact that as at 2001, over 70 percent of Nigerians live below the poverty line of 1 US\$ per day (UNDP, 2004), most of them in rural areas and depend on agriculture for sustenance, the federal government embarked on a series of economic reforms. In 2004, the federal government of Nigeria launched its National Economic Empowerment and Development Strategy (NEEDS) which identifies agriculture and reforming government and its institutions as core elements of economic growth. NEEDS is actually an important component of the new agricultural policy (International Conference on Agrarian Reform and Rural Development (ICARRD), 2006). In general terms, NEEDS offers a very promising strategic direction to achieve poverty reduction, food security, and accelerated economic development. NEEDS recognizes that a dynamic and competitive non-oil private sector is essential to rapid and sustained growth. Nigeria's key policy thrusts for agriculture and food security under this scheme were to: (i) provide the right policy environment and target incentives for private investment in the sector; (ii) implement a new agricultural and rural development policy aimed at addressing the constraints in the sector; (iii) foster effective linkages with industry to achieve maximum value-added and processing for export; (iv) modernize production and create an agricultural sector that is responsive to the demands and realities of the Nigerian economy in order to create more agricultural employment opportunities, which will increase the income of farmers and rural dwellers; (v) reverse the trend in the import of food (which stood at 14.5 percent of total imports at the end of 2001), through a progressive programme for agricultural expansion; (vi) strive towards food security and food surplus that could be exported; (vii) invest in improving the quality of the environment in order to increase crop

yields. The main targets include; achieve minimum annual growth rate of 6 percent in agriculture; (ii) raise agricultural exports to \$3 billion by 2007; (iii) drastically reduce food imports, from 14.5 percent by 2007; (iv) develop and implement a scheme of land preparation services to increase cultivable arable land by 10 percent a year and foster private sector participation through incentive schemes; (v) promote the adoption of environment friendly practices; (vi) protect all prime agricultural lands for continued agricultural production (National Planning Commission, 2004).

Apart from the agricultural sector wide policies and programmes, a number of single crop programmes were initiated to improve agricultural production and productivity in Nigeria in general and some strategic crops in particular. For instance, the Olusegun Obasanjo administration added some impetus to the global efforts in the development of cassava by putting in place a ‘Presidential Committee on Cassava for Exports’, with the mandate to ensure that the country becomes the world-acknowledged cassava-exporting nation. The presidential initiative on cassava production and export is therefore intended to raise the production level of cassava to 150million Mt by the end of year 2010. The programme is also expected to assist the country realize an income of US\$5.0billion per annum from the export of 37.6million tons of dry cassava products such as starch, cassava chips, adhesives and other derivatives (Abdullahi, 2003, Umeh and Asogwa, 2005; ICARRD, 2006). Currently Nigeria has replaced Brazil as the World’s largest producer of cassava (Nweke, 2004).

There is also the Presidential Initiative on increased Rice Production designed to reverse the rising import bill, which stood at N96.012 billion in 2002 to meet domestic demand by 2006 and export by end of 2007. By 2007, it is targeted that 3.0 million hectares of land would be put under cultivation to produce about 15 million tones of paddy or 9.0 million tones of milled rice. In order to achieve this goal, Government embarked on:-procurement and distribution of 81,505 R-Boxes to the States and Federal Capital Territory (FCT) at 50 percent subsidy. The R-Box contains rice seeds, agro-chemicals and extension messages to farmers on its applications. The package is required to cultivate one-quarter of a hectare of rice. Similarly, 250 units of Knapsack Sprayers have been distributed to farmers based on needs. Production of 4.92 Mt of breeder seeds and 25.23mt of foundation seed stage 1 of the new rice for Africa (NERICA) I and 12.6mt of lowland varieties of foundation seed stage 1 by

National Cereal Research Institute and West African Rice Development Association; production of 58mt of foundation seed of rice varieties by the National Seeds Service (NSS); establishment of Management Training Plots on R-Box in Twenty-five (25) states including the FCT. About 1,250 farmers participated in the programme to showcase the benefits derivable from the use of the R-Box to accelerate its adoption by farmers; provision of irrigation infrastructure and construction of water reservoir at National Cereals Research Institute (NCRI), Badeggi for all year round breeder seed production; Six train-the-trainer workshops for rice farmers and extension agents (one per geo-political zone) on rice production and processing technologies (ICARRD, 2006).

Further, in realization that, maize is among the most important crops in Nigeria, but poor seed supply, inefficient marketing system, and low investment in research are among the factors that have limited production, the federal government still under the leadership of President Olusegun Obasanjo initiated a programme to double maize production in the country both for national consumption and international export through promotion of improved agricultural technologies (USAID, 2006). The doubling maize programme began in 2006 and was funded by the Federal Ministry of Agriculture and Rural Development. Partners include IITA, the Institute of Agricultural Research and Training, National Rice/Maize Centre, National Accelerated Food Production Program, Institute for Agricultural Research, National Cereals Research Institute, the University of Ilorin and the National Agricultural Extension and Research Liaison Services. The target is to raise the production of maize from current 8 million tonnes to 20 million tonnes and productivity from the about 1.5 tonnes per hectare to 4.2 tonnes per hectare and the possibility of achieving this target proved successful with more than 1000 farmers used in experimentation (IITA, 2009). It is not known to what extent the intended productivity gains from improved agricultural production technologies have been realized through these policy initiatives. Therefore, it is of interest in this study to assess the impact of the promoted improved technologies (which serves as proxy for investment in research and development) on the economic efficiency of smallholder maize farmers.

At the inception of his administration in 2007, President Umaru Musa Yar' Adua who succeeded Chief Olusegun Obasanjo earmarked on a Seven-Point Agenda so that the

nation can move forward and be among the 20 largest economies by the year 2020. Briefly, the Seven-Point Agenda include: Energy and power, Food Security and Agriculture, Wealth Creation, Education, Land Reforms, Mass Transit and the Niger Delta issue. The broad policy objectives of both Vision 2020 and the Seven-Point Agenda are sustenance of a rapid broad based GDP growth, poverty reduction, employment generation, macroeconomic stability and economic diversification. To achieve this, Nigeria would require growth rates of between 13-15 percent in the medium-term, a goal which supersedes the 5-6 percent growth rate obtained then (Foreign Agricultural Service of United States Department of Agriculture (FAS, USDA), 2009). Like the Obasanjo administration (1999-2007), the thrusts of the policy direction for agriculture and food security within the seven point agenda include: creating the conducive macro environment to stimulate greater private sector investment in agriculture so that the private sector can assume its appropriate role as the lead and main actor in agriculture; rationalizing the roles of the tiers of government in their promotional and supportive activities to stimulate growth; reorganizing the institutional framework for government intervention in the sector to facilitate smooth and integrated development of agricultural potentials; articulating and implementing integrated rural development as a priority national programme to raise the quality of life of the people; increasing agricultural production through increased budgetary allocation and promotion of the necessary developmental, supportive and service-oriented activities to enhance production and productivity and marketing opportunities; increasing fiscal incentives to agriculture, among other sectors, and reviewing import waiver anomalies with appropriate tariffication of agricultural imports and promoting increased use of agricultural machinery and inputs through favourable tariff policy (Akinboyo, 2008).

As a response to the Seven Point Agenda, the Federal Ministry of Agriculture & Water Resources launched its National Food Security Programme (NPFS) in September 2008, to combat the global food crisis and with a vision to ensure sustainable access, availability and affordability of quality food to all Nigerians. The programme's vision is to eventually become a significant net provider of food to the global community and for the next four years (2008-2011), the federal government set aside N200 billion, which is about USD 1.7 billion, for the development of the programme. The short-term goals of the programme are to significantly improve the

country's agricultural productivity. In the medium term, the aim is to expand and improve large-scale production, improve storage as well as processing capacity and establish the required infrastructure. The long-term objective is to derive over 50 percent of the nation's foreign exchange through agricultural exports. (CBN, 2008; Corporate Nigeria, 2009). A number of agricultural initiatives are implemented under the NPFS which includes a significant increase in the quantity of assorted fertilizers distributed nationwide, the rehabilitation and expansion of existing irrigation schemes, as well as the retention of the policy of zero tariffs on imported agrochemicals (CBN, 2008).

Further, in a bid to fast-track the transformation of the agricultural sector, the federal government in collaboration with the World Bank, has established the Commercial Agriculture Development Programme (CADP). The Programme, which has five states (Cross River, Enugu, Kaduna, Kano and Lagos) participating in the first phase, aims at strengthening agricultural production systems for targeted value chains and facilitate access to markets. The project is estimated to cost US\$185 million, with the World Bank providing US\$150 million, while the federal and the participating state governments would provide the balance of US\$35 million (CBN, 2008).

With respect to input supply and distribution, three key inputs have received attention namely fertilizer, improved seeds and agrochemicals. Currently, the federal government of Nigeria, under the Federal Market Stabilization Program, procures fertilizer for sale to states at a subsidy of 25 percent. State governments typically institute additional subsidies on fertilizer. Under the current marketing structure, companies make bids to the federal government to import and distribute subsidized fertilizer (International Food Policy Research Institute (IFPRI), 2009). The seed sector is also a key component of the crops sub-sector. Most farmers in Nigeria depend on self-saved seeds. There is a thriving market in locally saved seeds by farmers. The formal seed trade is very underdeveloped. The National Seed Policy provides for coordination, monitoring and implementation of quality control in the national seed system (as regards seed production, marketing and quality control activities) by the NSS of the Federal Ministry of Agriculture and Rural Development. The National Seed Policy makes provision for the withdrawal of public sector agencies in favour of private sector in key areas of the seed industry. Another important segment of the

crops sub-sector is the crop protection chemicals the use of which is still very low among Nigerian farmers. Here the federal government's policy is to encourage the establishment of manufacturing plants to make agro-chemicals in Nigeria. But so far there are no manufacturers of agro-chemicals. Instead the companies that operate in Nigeria do only reformulation and packaging, relying on their parent companies abroad to do the basic manufacturing. A 50 percent subsidy is used to support machinery ownership in this sector (Department for International Development (DFID), 2005).

2.3 The Performance of Nigerian Agriculture

A critical review of the state and performance of the sector since independence will assist an understanding of the impact of the myriads of agricultural policies and programmes enacted and implemented over the years. Nigeria has the potential of supporting a heavy population of livestock, has 78.5 million hectares of agricultural land, of which 36.5 million hectares is arable land and 0.29 million hectares is equipped for irrigation as at 2008 (FAOSTAT, 2010). She also has 267.7 billion m³ of surface water and 57.3 m³ of underground water. The country is also blessed with abundant rainfall of between 3000 mm to 4000 mm per annum, as well as extensive coastal region that is very rich in fish and other marine products (Corporate Nigeria, 2009).

Despite Nigeria's rich agricultural resource endowment and well articulated agricultural policies and programmes by successive governments and international bodies, the sector has been growing at a relatively low rate. Less than 50 percent of the country's cultivable land is under irrigation and smallholder farmers, who use rudimentary production techniques, cultivate over 90 percent of this land (Corporate, 2009). Its current performance is poor relative to the pre-oil boom era. Prior to the 1970's and before the commercial exploration of petroleum, agriculture was a prime mover of the Nigerian economy. Agriculture's share of GDP was about 90 percent before 1960 and 56 percent between 1960 and 1969, supplying 70 percent of export, and 95 percent of food needs (CBN, 1992; Corporate Nigeria, 2009; Ojo and Ehinmowo, 2010). Currently its share of GDP is about 42 percent with the crop sector dominating the share. The growth rate of agriculture GDP has been increasing very

slowly though it witnessed a fall from 7.1 in 2007 to 6.5 in 2008 (table 2.1). Prior to the 1970's, Nigeria was among the world's leading producers of cocoa, palm oil, groundnut, cotton, rubber and hides and skin. However, from 1970 onwards, agriculture has been unable to spear-head the development of the Nigerian economy. Its share of total export stood at 0.58 percent as at 2008 while its share of total non-oil exports value dropped from 72.26 percent in 1992 (CBN, 2000) to 58.3 percent in 2008 (table 2.1). From an era of booming export trade in agricultural commodities, the Nigerian agricultural sector has degenerated to an import dependent one. Subsequently, it has failed to generate significant foreign exchange, feed agro-allied industries, improve the living standards of farming households and rural dwellers and provide effective demand for industrial use. In most of the period (table 2.1), the index of agricultural production increased.

Table 2.1 Selected agricultural development indicators: 2000-2008

Indicator	2000	2001	2002	2003	2004	2005	2006	2007	2008
Crop share in GDP	37.88	37.55	37.38	36.51	36.48	36.69	37.20	37.48	37.52
Livestock share in GDP	2.78	2.73	2.74	2.60	2.60	2.61	2.63	2.64	2.65
Fisheries share in GDP	0.62	0.60	0.58	0.54	0.54	0.53	0.53	0.53	0.53
Forestry share in GDP	1.37	1.42	1.44	1.37	1.37	1.36	1.37	1.37	1.37
Agric. Share in GDP	42.65	42.30	42.14	41.01	40.98	41.19	41.72	42.02	42.07
Agric GDP Growth rate	2.96	3.86	4.22	6.64	6.50	7.06	7.40	7.19	6.50
Aggregate index of production	149.20	148.90	154.90	165.40	175.50	186.90	200.1	212.8	227.9
Share in non-oil export	-	-	-	-	33.00	41.70	37.80	43.00	58.30
Share in total export	-	-	-	-	1.22	0.61	0.69	0.90	0.58

Sources: Central Bank of Nigeria, 2002, 2004, 2005, 2008; National Bureau of Statistics, 2007

At 227.9 (1990=100), the aggregate index of agricultural production increased by 7.1 percent in 2008, compared with 6.4 percent in 2007. However, the growth was below the national sectoral target of 8.0 percent (CBN, 2008). The increase in agricultural production was propelled largely by the sustained implementation of the various agricultural initiatives under the National Programme for Food Security. Such

initiatives included a significant increase in the quantity of assorted fertilizers distributed nationwide, the rehabilitation and expansion of existing irrigation schemes, as well as the retention of the policy of zero tariffs on imported agrochemicals (CBN, 2008). Even though, the index of agricultural production has been increasing, the concern of most Nigerians is that much of the increase is notional with little real impacts on the economy (Adekanye et al., 2009).

Food grain production increased relatively over the period though much of the noticeable increase was witnessed as from 1983 with about 5 percent decline in 2000 and 6 percent decline in 2001 and 2007 (figure 2.1). Total food grain production grew by 6 percent between 1961 and 2008. However, the productivity of food grain has been fluctuating, peaking at 7.42 in 1981, declined from 1982 to 2000, increased slowly from then throughout with exception of 2007 when there was a 5.04 percent decline (figure 2.2). This slight improvement in trend productivity of food grain from 2000 could be as a result of the strategic crop presidential initiatives during this period aimed at providing subsidized agricultural inputs (fertilizer and seeds) to farmers.

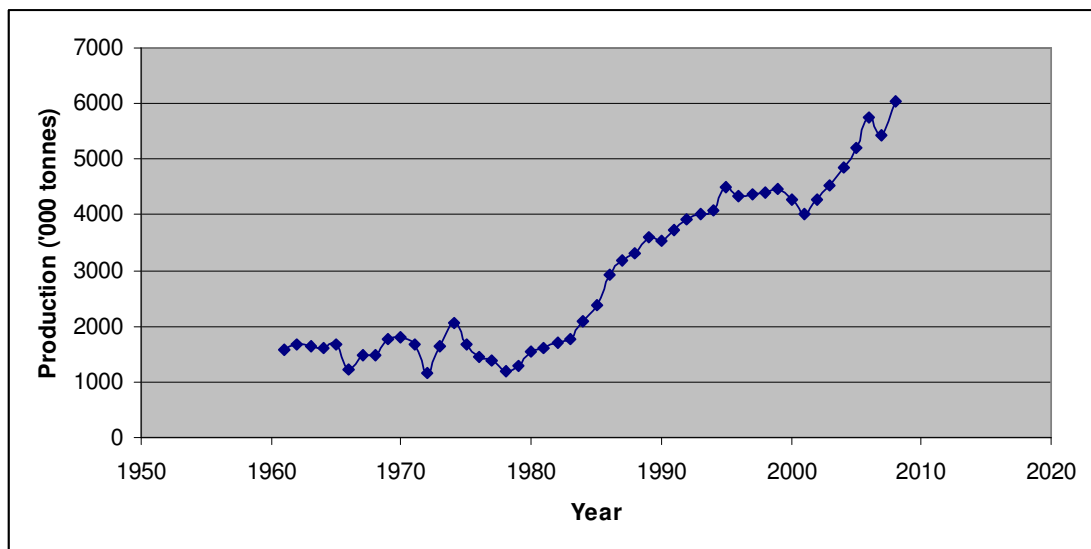


Figure 2.1: Trend in production of food grains

Source: Own computation using data from FAOSTAT (2010)

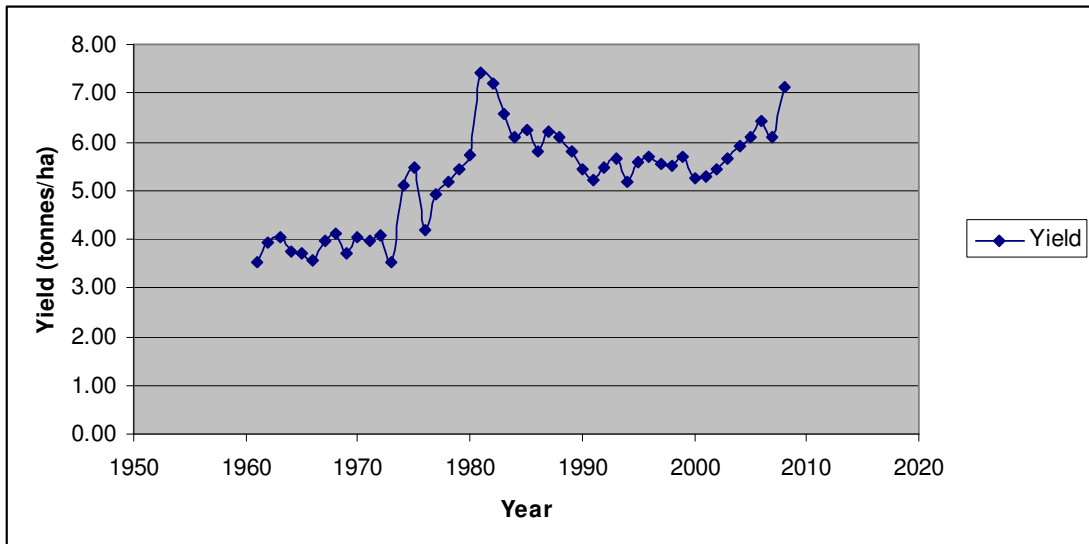


Figure 2.2: Trend in productivity of food grains

Source: Own computation using data from FAOSTAT (2010)

Prior to 1980, there was no noticeable increase in the production of major staple crops. However from 1980, there has been a general increase in the level of production (figure 2.3). For example the level of production of cassava, maize, millet, rice, sorghum, wheat and yam grew at 11, 12, 5, 65, 3 and 5 percent, respectively. The growth in cassava production in 2008 was attributed to increased use of improved cassava cuttings and an expansion of processing facilities across the country while growth in paddy rice production was attributed to the increased adoption of the high-yielding NERICA rice variety and the adoption of the Rice Box technology by farmers (CBN, 2008). In addition, good rainfall years coupled with crop protection measures contributed to the good harvest (USAID, 2006). The level and growth rate of productivity of major staple crops are very low and the later even turn negative in some years. For instance, whereas the average level of productivity of maize, millet, rice, sorghum and wheat for the period 1961-2008 were 1.22, 1.03, 1.64, 1.01 and 1.74, respectively (figure 2.4); their productivity grew at the rate of 3.04, 4.36, 2.05, 0.94 and -0.15 percent, respectively.

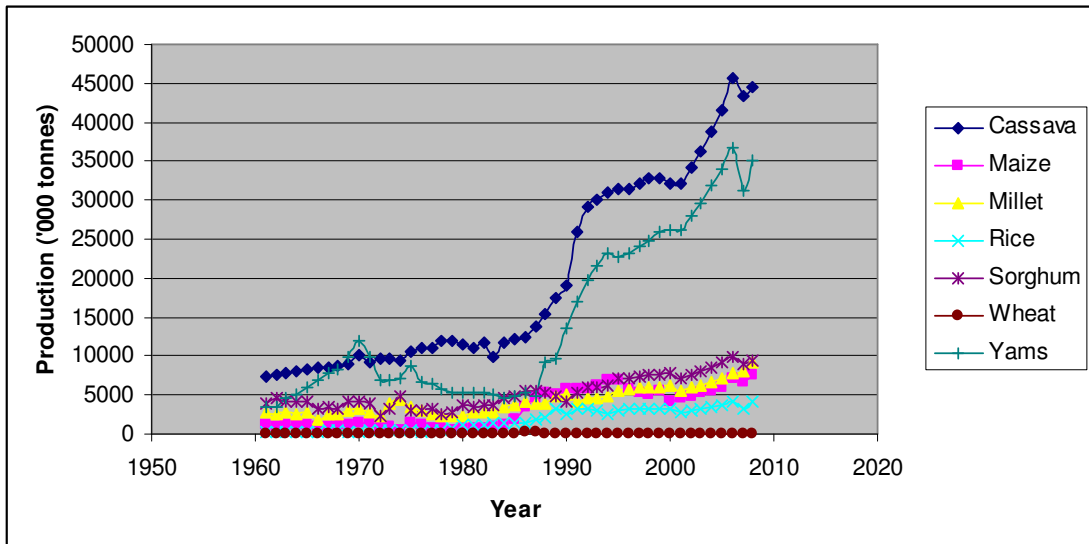


Figure 2.3: Trend in production of some major crops

Source: Own computation from FAOSTAT (2010)

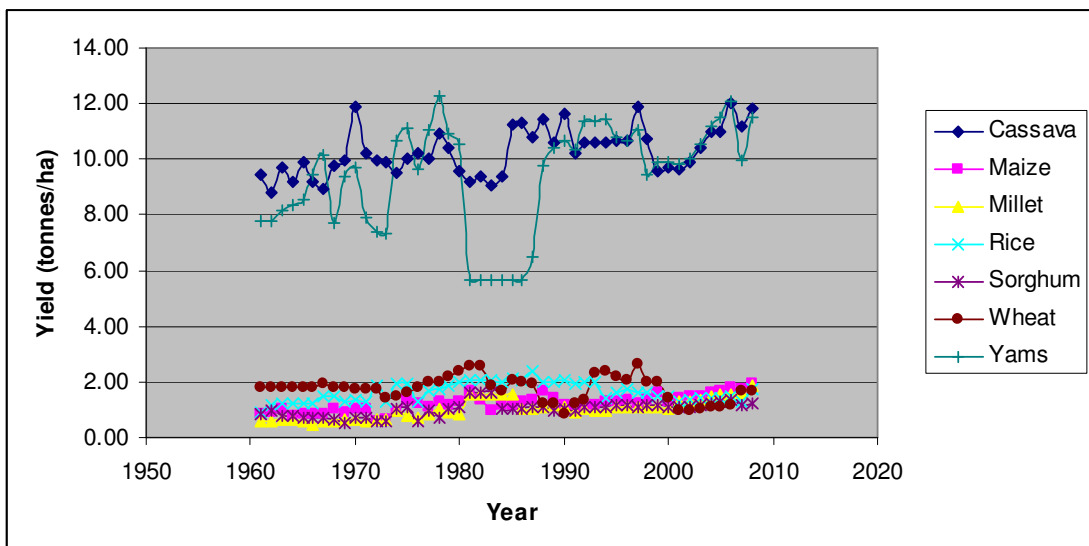


Figure 2.4: Trend in productivity of some major staples

Source: Own computation using data from FAOSTAT (2010)

One of the consequences of the low productivity is a widening demand-supply gap which resulted to huge food import bill incurred by Nigerian government over the years in order to bridge the demand-supply gap. About US\$3.0 billion and US\$3.99billion, representing about 8 percent and 8.1 percent of total foreign exchange disbursement on imports were utilized on food importation in 2007 and 2008, respectively (CBN, 2008). This amount is quite significant, particularly against the backdrop of the huge agricultural potential of the country. Most of the food items

being imported can be grown abundantly and processed within the domestic environment. Another consequence is high food prices in the country. Food prices have generally been on increase. The surge in the prices of food and other essential commodities has been alarming. For example, the price of cassava, maize, millet, paddy rice, sorghum, wheat and yam grew by 60, 93, 75, 39, 63, 69 and 178 percent, respectively from 1991 to 2007 (figure 2.5). The price of a 50 kg bag of the premium brand of imported rice (caprice gold) which stood at about N7, 500 in December 2007 rose to N14, 000 by March 2008, representing an 87 percent price increase. Similarly, the prices of palm oil, maize, guinea corn, beans and garri rose by 36, 28, 16, 12 and 8 percent, respectively, over the same period (CBN, 2008).

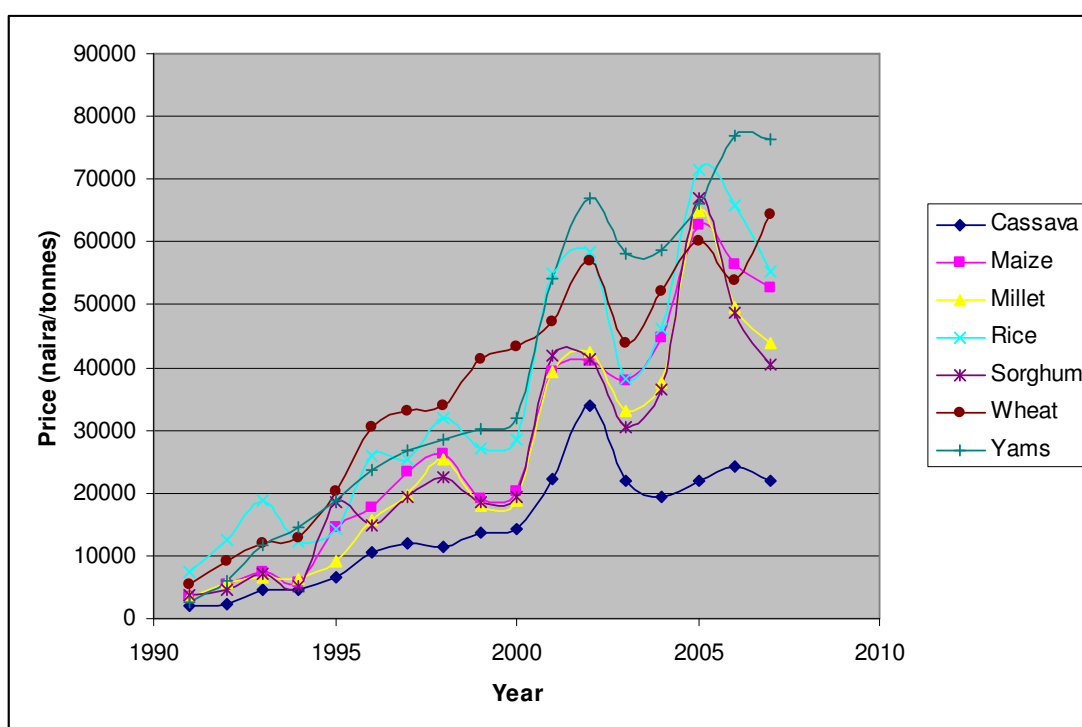


Figure 2.5: Trend in producer prices of some major staples.

Source: Own computation using data from FAOSTAT (2010)

CBN (2008) reported the remote and immediate causes of the current food price increases in Nigeria. First is the weak production structure in the agricultural sector. The farm landscape is dominated by smallholder farmers who still utilize crude implements and operate with traditional, inefficient production methods. The level of tractor use is still very low with the entire country having only about 30, 000 tractors, half of which are not functional. This compares unfavourably with India (also an

emerging economy), where the state of Punjab alone can boast of 450,000 functional tractors. Also, the use of improved technologies has been sub-optimal. For instance the use of fertilizer has been on decline after reaching a peak in 1993 with only a slight increase between 1998 and 2001 (figure 2.6). The average global rate of NPK fertilizer application is 93 kg per hectare, while that of Nigeria is a mere 13 kg per hectare (CBN, 2008). The main constraints to fertilizer use are seen as high prices, low fertilizer quality and non availability of fertilizer at the time required (Banful et al. 2009). The government’s stated reason for fertilizer subsidies is that farmers cannot afford a free market fertilizer price. However, most stakeholders and farm-level surveys indicated that quality and availability are the main constraints. While farmers will use more fertilizer if prices are lowered, farmers would use much more fertilizer at prevailing market prices if the quality was good and if fertilizer was available when needed (Nagy and Edun, 2002).

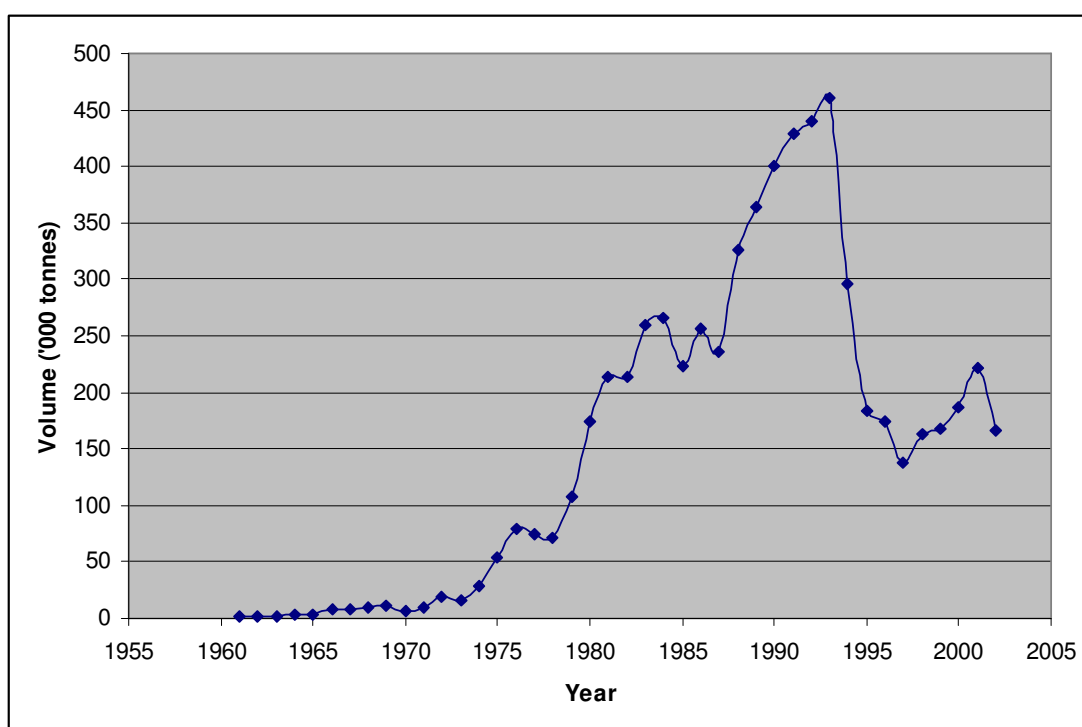


Figure 2.6: Trend in fertilizer utilization

Source: Own computation using data from FAOSTAT (2010)

Other causes of high food prices include grossly inadequate and inefficient storage and processing facilities, reflecting the high level of post-harvest losses, estimated at about 50 percent for fruits and vegetables, and 30 percent for root crops and tubers.

Second is the dearth of support infrastructure, notably an inefficient transportation system and the high cost of energy, both of which constrain the movement of farm produce from rural to urban centres. The railway system has virtually been grounded in the last two decades, thereby making the bulk movement of foodstuff from production centres to the markets impossible. The cost of diesel to power trucks that convey food stuffs across the country has been soaring and sold above N160 per litre in 2008.

Third, there is the inflation pass-through of international food prices. The dominance of imported food items in the menu of most urban families meant the easy and smooth transmission to the domestic economy of not only the global price changes of the commodities, but also the significant increases in freight charges. In this manner, the increases in the import prices of commodities have been transmitted to the domestic market. Fourth is the poor weather condition experienced in 2007, particularly in the Northern States. Widespread incidents of drought were reported in most grain producing areas such as Jigawa, Yobe, Sokoto, Katsina, Kebbi, Gombe, Kano and Borno States. In the North Central States, the rains stopped earlier than usual and these impacted negatively on food production in 2007 (CBN, 2008). Although, the foregoing analysis concentrated on the crop since it is the dominant sub-sector, the performance of other sectors is not quite different.

Perhaps the most disheartening challenge that Nigeria has faced since the 1980s is mass poverty. Given the large share of labour employment in the agricultural sector, it is expected that poverty level in Nigeria should be seriously abated if the sectors performance is to be applauded. The poverty level rose precipitously from about one quarter in 1980 to two thirds of the population in 1996. The trend has, however, been abated since 2004 when poverty fell to 54.6 percent, having dropped from over 65 percent in 1996. Yet, more than half of the population are still living below the nationally defined poverty line (NBS, 2005, 2007, 2008).

A catalogue of reasons has been advanced for the relative poor performance of the Nigerian agriculture sector. Key among these are macroeconomic disequilibria including interest and foreign exchange rate volatilities; poor infrastructure base; policy inconsistency and unnecessary intervention by the public sector which sends

wrong signals to the private sector. Other important constraints include inadequate budgetary allocation to agriculture, over-dependence on crude oil revenue, rural-urban migration, inadequate processing and storage capacity, resource poverty and smallness of farm holdings, almost total dependence on rain-fed farming, aging farm population, use of inefficient traditional technologies, adoption of poor and non-sustainable agricultural practices, inadequate agricultural extension services, escalating environmental degradation, political instability and increasing population pressure, disincentive effects of low returns, weak/fragmented agricultural markets and other support institutions as well as dilapidated and mostly non-existent rural infrastructure, low levels of value-adding and insufficient investment in agricultural research and technology (Manyong et al., 2003; Okoye, 2004; USAID, 2006; Banful et al., 2009).

2.4 Summary and Conclusions

This chapter provided a review of past government policies and programmes in agriculture and the performance of Nigerian agriculture. The review shows that agricultural policies and programmes were designed to facilitate increased agricultural development. Major policy instruments used in the various policy regimes included those targeted to agricultural commodity marketing and pricing, input supply and distribution, input price subsidy, land resources use, agricultural research, agricultural extension and technology transfer, agricultural mechanization, agricultural cooperatives, and agricultural water resource, irrigation development and environmental sustainability. Despite the existence of abundant natural resources and the implementation of agricultural policies in Nigeria over the years, the performance of the agricultural sector has hardly improved. Although agriculture still contributes a lion share of the gross domestic product which stands currently at 42 percent, this contribution is very poor compared to those of pre 1970 era when its contribution ranged between 60 to 90 percent. Agricultural export which once moved the economy forward had declined to as low as 0.58 percent of total export by 2008. Agricultural production essentially increased, but the productivity of major cereal and tuber crops such as cassava, maize, rice, millet, sorghum and yam only grew at a marginal rate ranging from 0.52 to 4.36 percent. The low productivity created demand-supply gap resulting in higher domestic food prices and high food import bills. This poor

performance reflects underlying sector-wide and economy-wide constraints, which the national agricultural policy has been unable to tackle. In essence they reflect shortcomings in the national policy on agriculture. Slower rate of adoption of new technologies also contributed their quota in impeding achievement of policy objectives. Nigeria has not fully embraced science-based agriculture and the use of fertilizer, improved seeds, and agro-chemicals is limited. These reduced the expected benefits of yield increases accruable from the adoption and use of these improved technologies. Land expansion is limited and without the use of modern agricultural technology, agricultural production and productivity may decline further. Effective policies and programmes that encourage high investment and high growth rate are highly needed to revamp the Nigeria's agricultural sector.