

**NIGERIA'S AGRICULTURE SECTOR ASSESSMENT:
ISSUES OF TECHNOLOGY DEVELOPMENT AND TRANSFER**
(REVISED FINAL REPORT)

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RURAL SECTOR STRATEGY STUDY:

Technology Development and Transfer in Agriculture

Executive Summary

1. Past agricultural production and productivity estimates in Nigeria by various agencies or organizations all show that the country's agriculture sector has performed below expectations. Recent FAO, World Bank, United Nation's Economic Commission for Africa, and Central Bank of Nigeria estimates of per capita food production index (in grain equivalents) confirm that the average Nigerian had less than 400 kg of grain equivalent of food available to him in 1998. On the other hand, the Central Bank of Nigeria, Federal Office of Statistics, and Nigerian Population Commission indicate that while Nigeria's population has been growing at 3 percent per annum, that of food production has been increasing at only 1.5 percent per annum in the last five years. Consequently, the food self-sufficiency ratio of the country has been decreasing from a 98 percent level in the early 1960s to less than 60 percent in the early 1980s and less than 54 percent by 1989. Within the 1990s, the situation did not improve.

2. Many reasons have been advanced to explain this pitiable and seemingly unending poor sector performance. Among these reasons is the low level of adoption of modern improved technologies in the agriculture sector. The study reported in this document is an attempt to assess the country's agriculture sector performance with respect to technology development and transfer. It has three complementary themes or components, namely:

- *Technology development and transfer* component that identifies constraints and opportunities in the technology system, and suggests a strategy for enhancing the system's efficiency and opportunities for public-and-private sector linkages;
- *Micro-enterprise development* component that emphasizes agriculture-sector financing, growers' support services, gender, human capital and non-farm activities; and
- *Private sector agribusiness development* that identifies opportunities for greater private sector involvement in the growth and development of the agriculture sector.

3. Accordingly, the specific objectives of the study are to:

- Identify major constraints that militate against the effectiveness and efficiency of technology systems in Nigeria;
- Identify technical, policy and institutional constraints that hinder micro-enterprise and agribusiness development in Nigeria with emphasis on agriculture sector financing, growers' support services, gender involvement, human capital and non-farm activities; and
- Indicate opportunities for greater private sector involvement in agricultural sector growth and development through suggested investment opportunities and appropriate strategies that could enhance the effectiveness and efficiency of the development and transfer of agricultural technologies to end-users.

4. Among the major findings of the study are the following:

- i. First, there are numerous improved agricultural and other agribusiness-support technologies available in the country that could substantially improve Nigeria's agricultural production and productivity if only they were effectively transferred to farmers and the agribusiness sector. For example, the most widely adopted and productive crop technologies include those of:
- a) Cassava – TMS30555, TMS30572, TMS4(2)1425, TMS50395, and NR40144;
 - b) Yams – TDr89/02665, BN335, TDr3660, TDr95/19158, and TDr95/19158;
 - c) Rice – WAB4501BP16341, WAB4501BP33HB, IRAT144/FARO39, WAB4502423P33HB, and WAB35-2Fx;
 - d) Maize – AM9801, AM9805, AM9806, AM9807, and AM9808;
 - e) Cowpea – HTR-IT93K6937, TN12180, TN9380, K VX414-222, and K VX4142272;
 - f) Soybean – TGX9232E, TGX10192EB, TGX14483E, TGX14851D, and TGX16813F.

In addition to these crop technologies, various university food technology departments have developed forty-one hardware-type hand-operated post-harvest technologies. Other research centers like IITA have, on their part, also developed a number of post-harvest and other technologies that are either “software” (processes) or “hardware” (equipment) for use at both the production and processing ends of farmers' activities. These are:

- ◆ Under post-harvest “software” technologies - three processes:
 - a. Cassava bread recipe;
 - b. Production of soy-cheese using plant coagulant; and
 - c. Cottage, small scale level processing of soymilk for the production of bean-odour-free soymilk; and
- ◆ Under post-harvest “hardware” technologies – 41 simple (often hand-operated) processing equipments have been developed. These are summarized in *Appendix 12*;

- ii. Secondly, new market and economic liberalization policies that create an enabling environment for encouraging the private sector to play a more dynamic and supportive role in agricultural development have fortunately now been adopted in the country;
- iii. Finally, A critical analysis of the process involved in agricultural technology transfer from developers to farmers shows that:
- a. The delay in technology transfer to farmers is largely due to the fact that over 98 percent of the agencies involved in developing, commercializing and finally transferring these technologies are public entities. Involving more of the private sector in technology development and transfer within a country has been known to contribute to a faster green revolution throughout the world;
 - b. As presently constituted, farmers are generally brought into the process of technology development too late in the process. There is need for them to be involved right from the early stages of the technology conceptualization, identification and selection so as to include variety qualities desired by the farmers and known to be acceptable in the target agro-ecological zone. Such a participatory

process greatly shortens the lengthy discussion and trial periods often required after scientists have developed the technology in isolation;

- c. Bureaucratic discussions within each of the public agencies handling technology release approvals (especially the National Improved Commodity Centers, the Variety Release Committee, and the National Seed Service) and shuffling between them add avoidable time to the observed delay in this technology transfer process. Collapsing their debates to joint sessions could save very valuable time in this technology dissemination process;
- d. The country does not have an agricultural technology development agenda with the result that activities in the technology sub-sector of agriculture are conducted on trial-and-error basis – thus hampering its development and productivity. Most actions undertaken in the sub-sector are ad-hoc and discretionary, unsystematic and non-sequential. There is no priority setting process with respect to technology R&D on the part of both public and private sectors; and
- e. The Government of Nigeria poorly allocates and distributes funds to support agricultural technology development and dissemination to farmers. Statistics show that over a 18-year period of 1980-1997, Nigeria spent only 1.45 percent of her entire agriculture GDP or about 0.1 percent of her entire annual budget on agricultural research (Ikpi & Ikpi, 1998). The fraction of that amount that was spent on technology development and dissemination was negligible.

5. Consequently, the quantum of technologies being transferred to Nigerian farmers is inadequate and forces them to depend more on and demand the use of other production resources like labor, land and capital - although all three factors are quite limiting in the country's farm production systems. This, coupled with other critical constraints listed below, has seriously hindered technology transfer and commercialization:

- Policy inconsistency;
- Insufficient funding of the agriculture sector;
- Low scientific and managerial capacity in agriculture;
- Non-competitiveness of agriculture;
- Poor information dissemination;
- Poor market development; and
- Politicization of technology development and transfer.

6. The pricing of improved technologies in Nigeria is seen to be supplier-determined. This is because the low level of profitability in technology dissemination business seriously discourages private-sector investors from getting into the sub-sector and turns end-users of these technologies into price-takers in spite of existing great potential demand for the technologies and their value-added products at local, regional, and global markets.

7. In terms of methods used in transferring technologies to farmers, all past agricultural extension programs/systems in the country are found to have been institutionalized under three principal government agencies: Agricultural Development Programs (ADPs), State Ministries of Agriculture and Natural Resources (MANRs), and River Basin Development Authorities (RBDAs). Involving only these public agencies in the extension services of the country has constituted the first mistake in the implementation of technology transfer in the agriculture sector. Being civil servants, Nigerian extension agents worked with neither commitment nor enthusiasm. The extension programs they

implemented were foreign - being imposed upon them by foreign “experts” or involuntarily “imported” from other countries. Consequently, they were ineffective and costly. The programs have ranged from the World Bank’s “train and visit” (T&V) method to the corner-plot model – all of which have had limited impact.

8. The major lessons learned from these past extension programs are that:

- i. It is not possible for government alone to fund and support extension programs in all their ramifications. The private sector needs to play a more active role in both the funding and the physical transfer of available improved technologies;
- ii. Most of the programs turned out to be location/state-specific in terms of the level of attainable success because of the costly nature of the models applied;
- iii. Many of these programs were established with too large and ambitious a scope given the limited available human and funding resources for implementing them; and
- iv. The needed links to operationalize technology transfer and commercialization between technology developers, disseminators and farmers have been poor, ineffective and often completely non-existent under some of the established extension programs.

9. Today, out of the six extension programs that have been operated in the country in the last thirty years, (namely: Farm Settlement Schemes, FSS started in 1959; River Basin Development Authorities, RBDA established in 1967, amended 1977&1979; National Accelerated Food Production Program, NAFPP established in 1971; Agricultural Development Programs, ADP started in 1972; Operation Feed the Nation, OFN established in 1976; and Green Revolution Program, GRP established in 1979), only two (RBDA and ADPs) still exist and are being operated in limited scopes.

10. Given the ineffectiveness of these past extension programs in Nigeria’s technology development and transfer, this study recommends the adoption of a new approach that could more effectively enhance targeted agricultural technology transfer and commercialization. Such a new approach should encompass the following elements/programs:

- i. Increased private-sector participation in the effective multiplication and dissemination of already existing and acceptable production technologies to farmers at reasonable and competitive prices;
- ii. Establishment and operation of effective and functional private-sector micro-credit/finance organizations that target farmers with the aim of ensuring increased and sustained accessibility to improved technology for production, processing, storage and marketing;
- iii. Formulation and systematic adoption of an agricultural technology development agenda by a competent team of Nigerian agricultural scientists working closely with government policy makers/implementers to create new roles for NARS participants;
- iv. Sustained investment in agro-industrial processing enterprises and marketing arrangements that support farmer organizations;
- v. Support for local private-sector fabrication of necessary processing machines, tools and equipment for the agro-industry that will absorb the increased output flowing from the adoption and use of available improved production technologies; and
- vi. The use of private sector, non-governmental organization personnel/technical experts who can work on one-on-one basis with farmers to ensure the transfer of

targeted technology for attaining specific solutions at the production, processing and marketing stages of agribusiness.

1. INTRODUCTION

11. Past agricultural production and productivity estimates in Nigeria by various agencies or organizations all show that the country's agriculture sector has performed below expectations. Recent FAO, World Bank, United Nation's Economic Commission for Africa, and Central Bank of Nigeria estimates of per capita food production index (in grain equivalents) confirm that the average Nigerian had less than 400 kg of grain equivalent of food available to him in 1998. On the other hand, the Central Bank of Nigeria, Federal Office of Statistics, and Nigerian Population Commission indicate that while Nigeria's population has been growing at 3 percent per annum, that of food production has been increasing at only 1.5 percent per annum in the last five years. Consequently, the food self-sufficiency ratio of the country has been decreasing from a 98 percent level in the early 1960s to less than 60 percent in the early 1980s and less than 54 percent by 1989. Within the 1990s, the situation did not improve.

12. Many reasons have been advanced to explain this pitiable and seemingly unending poor sector performance. These have ranged from Aribisala's (1973) characterization of the average Nigerian farmer as "an irrational, conservative, ignorant, and superstitious resource allocator", to Ikpi's (1988) blame on non-policy relevance of funded agricultural research work that in most cases ends up prescribing for adoption by poor farmers expensive and unaffordable improved agricultural technology packages. In between these two observations, other students of Nigeria's agriculture have attributed the poor performance of the sector to:

- Resource poverty and unnecessary intervention in agricultural production by the country's public sector (Olayide, 1976);
- Inability of the average Nigerian farmer to operate a viable farming system (Ellman, 1979);
- Increasing population pressure on the land (World Bank, 1981);
- Poor extension services and contact with farmers (Okigbo, 1983);
- Increasing environmental degradation and adoption of non-sustainable agricultural practices (Eicher, 1985; Brown and Wolf, 1985); and
- Insufficient investment in agricultural research and technology development (Stifel, 1986).

Recent indications indicate that the rate of agricultural technology development and transfer plays a more critical role in this poor sector performance than hitherto assumed.

13. The three-part USAID study that is reported in this section of the *New Rural Sector Strategies* document is an informed assessment of technology development and transfer in Nigeria's agriculture sector with a view to providing detailed information and data with which to define short-term priorities and develop long-term strategic objectives for supporting a *transition strategy* of the United States Government for Nigeria. The US transition strategy for supporting Nigeria is principally aimed at strengthening institutional capacity for economic reform and agricultural growth. The study was, therefore, purposely planned to complement a World Bank one conducted at the same time to cover Nigeria's rural sector development needs.

A. Objectives of the study

14. The specific objectives of this section of the report are to:

- Identify major constraints that militate against the effectiveness and efficiency of technology systems in Nigeria;
- Identify technical, policy and institutional constraints that hinder micro-enterprise and agribusiness development in Nigeria with emphasis on agriculture sector financing, growers' support services, gender, human capital and non-farm activities; and
- Indicate opportunities for greater private sector involvement in agricultural sector growth and development, and suggest investment opportunities and appropriate strategies that would enhance the effectiveness and efficiency of the development and transfer of agricultural technologies to the end-users.

B. Method of Data Collection

15. This report is based on information and data collected from both primary and secondary sources. The secondary sources provided information on past policy issues relating to technology development and transfer, while the primary sources provided information on current production, commercialization and marketing of agricultural technology in both the public and private sectors. In the field data/information collection, representative stakeholders were selectively and systematically visited and interviewed during the months of April, May and June 2000 using a set of questions.

16. The stakeholders visited included:

- Agricultural researchers and product developers;
- Agricultural technology developers, suppliers and users;
- International and national research centers/institutions;
- Universities in the country with active food technology departments;
- Improved seed commercialization companies;
- Agricultural training institutions;
- Producing farmer-groups and cooperatives (especially women groups);
- Agricultural produce processors and marketers;
- Agricultural micro-enterprise operators;
- Small- and medium-scale agro-industrialists and agribusiness operators that process or transform primary products and market value-added goods;
- Agricultural policy makers and implementers in relevant government ministries;
- Banks and other agricultural funds providers/financiers;
- Micro-credit and financial intermediaries;
- Non-governmental organizations (NGOs) working with farmers/processors and/or connected with agricultural technology production and marketing;
- Agricultural product quality controllers; and
- Final consumers of agricultural products.

17. Eleven research centers and institutions (listed in *Appendix 1*) were visited for the purpose of:

- Identifying least-cost technologies developed for small- and medium-scale enterprises by these centers/institutions and having market potential for adoption;
- Identifying and documenting possible areas of cooperation with USAID (Nigeria) in promoting and facilitating technology transfer and commercialization; and
- Exploring possible partnerships between the public and private sector entities connected with technology development, transfer and commercialization.

In addition, twelve private sector farmer organizations, large individual farmers and non-governmental organizations were visited and exhaustively interviewed. A list of these farmer organizations is contained in *Appendix 2*.

18. Information and data collected from the farm organizations and centers visited include:

- Exact physical description and organizational structure of the organization;
- Nature of operations each organization engages in;
- Size of the operations;
- Level of investment that has been put into the business;
- Major problems/constraints faced by each organization and its members;
- Major opportunities available in the technology system for these organizations;
- How they are currently relating with technology developers and distributors; and
- Future expansion plans of the organization.

Other information was collected on:

- ◆ Who develops the technologies currently used by these organizations;
- ◆ Where these technologies are developed;
- ◆ What technologies are currently in use, in the shelves, and in the pipeline;
- ◆ What opportunities there are for effectively linking technology developers and end-users; and
- ◆ Those that are currently involved in technology transfer and commercialization.

C. Methods of data and information analysis

19. Simple tabular and comparative expository analyses that highlight impacts of past public policies and actions/activities of private-sector farmer organizations are used in presenting the information and data collected during this study.

II. AGRICULTURAL TECHNOLOGY DEVELOPMENT AND TRANSFER IN NIGERIA

20. The rate of agricultural development in Nigeria has always been hinged on the rate of development of the country's agricultural technology. Interestingly, since the country's independence, her agricultural development has undergone significant fundamental changes and evolutionary processes that have not improved the sector's performance. These changes have been especially manifested in the significant shift in emphasis from commercial agriculture in food crop production (for domestic consumption) and tree crop production (for export) during the early 1960s to food importation starting from late 1970s. Development economists have always put the blame for this shift in emphasis on the emergence of petroleum as the chief source of foreign exchange for the country, and government's resulting neglect of the agriculture sector. Within the same period of time, the effect of new and improved agricultural technologies that, in other countries, had led to a green revolution has been negligible in Nigeria. Viewed in retrospect, Nigeria's agricultural development up to date can be seen to have evolved in three distinct phases. The first phase covered the colonial period (1914-1959) and the first post-independence decade (1960-1969); the second phase spanned the period 1970-1984; and the third phase started from 1985 and has continued to our present day.

21. During that *first phase*, agricultural development was almost entirely in the hands of millions of private-sector small-scale farmers with minimum direct government intervention in agriculture. Government support for these farmers was, at the time, largely regional in scope and character, and came in the form of regional governments enacting policies and establishing agricultural institutions for research, extension and

crop export/marketing. The federal government contributed only through agricultural research support. Observers saw the attitude of government during that first phase as resulting from the fact that agriculture was regarded and treated as a residual sector in the economy. Happily, the sector performed well then, and so did not attract any government undue interference up till 1960 after which time some regional governments established farm settlement schemes as a way of “modernizing” agriculture. Soon after the country’s independence in 1960, however, there appeared signs that the agriculture sector was running into some difficulty. Such signs included declining export crop production and food shortages that were at first non-alarming. These signs were, at the time largely believed to be transitory, especially given the Nigerian civil war that soon provided an acceptable excuse for poor agricultural performance.

22. Generally declining and poor performance in the sector characterized *the second phase* of agricultural development in Nigeria. This subsequently led the government to fundamentally change its former posture of almost non-intervention to one of complete control of agriculture. Government’s new approach took on maximum intervention in the form of multidimensional direct involvement through aggressive agricultural policies, programs and projects. It was during this period of full government involvement that crude oil was discovered in the country, and that provided a good excuse for government to tactfully withdraw from agriculture and leave the plaguing problems on the sector to the farmers. That was how the neglect of the sector began in the 1970s. Later attempts by government through enacting generally ineffective and unimplemented macro and micro policies did not help the situation.

23. *The third phase* of Nigeria’s agricultural development has witnessed the ineffectiveness of many of government’s policies and programs. In order to tackle the problem, government has had to shift from supply-side to demand-side management policies. These started with the:

- Enactment of an Economic Stabilization Act in 1982 to control foreign exchange and restrict imports;
- Reduction in capital and recurrent expenditures of federal and state governments;
- Placement of all imports under specific import license in 1984; and
- Declaration in 1985 of a fifteen-month “economic emergency” period during which several austerity measures were adopted and specified percentages of workers’ salaries and corporate profits were paid to government. This marked the beginning of the introduction of the structural adjustment program (SAP) that was finally launched in 1986.

At that time agriculture was explained to be the chief corner-stone of the structural adjustment program and farmers were informed that SAP would provide the best basis for attaining self-sufficiency in food and raw materials through increased domestic production resulting in increased farm incomes of the rural poor. Unfortunately, the structural adjustment program was not allowed to run its full course before it was unwittingly terminated by the Abacha regime. This left the agriculture sector high and dry such that initial benefits (like increased agricultural output, higher agricultural produce prices, and reduced food prices for consumers) that had started showing quickly turned into hardship for the ordinary farmer. Many of the former laudable policies and programs/projects that had been put in place to support agricultural development were abandoned.

24. Such policies and programs included:

- ❑ *Agricultural commodity marketing and pricing* policy which set up and operated six commodity boards for cocoa, groundnuts, palm produce, cotton, rubber and food grains (maize, millet, sorghum, wheat, rice and cow-peas);
- ❑ *Input supply and distribution* policy which ensured adequate and orderly supply of modern agricultural inputs;
- ❑ *Agricultural input subsidy* policy for fertilizer, seed, agro-chemicals, and tractor-hire services;
- ❑ *Land-use* policy which controlled land ownership and land use pattern;
- ❑ *Agricultural research* policy which concerned the provision of institutional mechanisms for coordinating research and extension nationally;
- ❑ *Agricultural extension and technology transfer* policy which eradicated the former practice of state-based agricultural extension and instituted a new country-wide extension system in which extension personnel were deployed to specific national programs and projects in order to facilitate the adoption of new technologies by farmers;
- ❑ *Agricultural mechanization* policy which encouraged the operation of tractor hiring units by states and substituted the use of some appropriate forms of mechanical power for human labor;
- ❑ *Agricultural cooperatives* policy which mobilized rural people for social and economic development through membership in agricultural cooperatives;
- ❑ *Water resources and irrigation* which established eleven River Basin Development Authorities in 1977 with the overriding responsibility for developing land and water resources in the country for agriculture;
- ❑ *Establishment of government-owned companies* in the 1970s for producing oil palm, cocoa, grains, roots and tubers, fish, livestock, etc.; and
- ❑ *Launching of “Operation Feed the Nation” (1976-1979) and “Green Revolution” programs (1980-1983)* to spearhead increased food production in the country.

25. With the abrogation or proven ineffectiveness of most of the above policies and programs, Nigeria’s agriculture has floundered. The last agricultural policy document that was produced, adopted and launched by the Babangida administration in 1988 for a fifteen-year implementation span has remained in the shelves of officials of the federal ministry of agriculture without being used as the agricultural development guide it is intended to be. Administration after administration since Babangida has ignored the policy document and the programs and strategies recommended for achieving the stated policy objectives. This attitude of the government bureaucrats in charge of agricultural development in the country has constituted the progeny of problems in the sector.

26. Agricultural technology development was, thus, *ab initio* understandably stalled and could not take place in a vacuum when the policies, projects and programs that should fuel its demand were absent. The problems of seeming ineffective contribution of technology development to the agriculture sector of this country have their origins rooted in this flip-flop implementation background.

A. Nigeria’s agricultural technology development system today

27. Appreciating Nigeria’s agricultural technology development system as it is today requires a good understanding of what constitutes the country’s agricultural technology system and the constraints that have hindered its development. The country’s agricultural technology system is a complex arrangement that encompasses the public and private sectors. It is an integrally woven combination of all those elements that bring about desirable technical change in the sector. In terms of participant composition, the system

comprises *technology developers* (who are from both the public and private sectors), *technology disseminators* (with the public sector dominating), and the *technology users* themselves. All three categories operate within limits of defined mandates to serve the intended beneficiaries – the final consumers. Details of the principal actors in these three groups are given later.

28. The key components of the system are:

- Production technologies through genetic improvements in both crops and livestock;
- Biological-control technologies;
- Irrigation technology;
- Simple mechanical equipment and technologies for soil preparation & seed planting;
- Post-harvest processing and storage technologies;
- Livestock feeding and management technologies;
- Information technology; and
- Public and private sector partnerships in technology development and transfer.

29. Important elements or factors of change that have combined to drive the country's agricultural technology development have been:

- i. Increases in demand for specialty products by consumers in the country;
- ii. Improved transportation, especially the trans-national railroads;
- iii. Adoption of widely applicable mechanical technology;
- iv. Increased availability of low-cost labor;
- v. Importation of technology from other countries with similar climates through immigration, with immigrants bringing their human capital, knowledge, and favored plant varieties; and
- vi. Accumulation of knowledge about Nigeria's environment and production practices.

30. Generally, these factors of change continue to drive the engine of growth in the sector. Their continued neglect has often led to a drifting of policy interpretation and application in the sector. Further more, a close examination of the above-listed technology components and factors of change shows that the country's agricultural technology system is still under-developed. Although there is evidence of existence of the various components, their levels of development and application suggest a dominant primitive and traditional technology culture setting. For instance, agricultural technology development in the country is, at the moment, primarily limited to producing improved, disease-resistant, high-yielding hybrid and non-hybrid seeds, germplasm and varieties for the farmer. In addition, there is a limited element of introduced irrigation technology in the northern parts of the country, but this is in the form of "white elephant" projects that lack maintenance and so are very dysfunctional most of the time. Not enough attention has been given to the development of agricultural hand tools and small-scale processing equipment for the farmers with small farm-holdings. Also, many agricultural technology components enumerated above are grossly deficient in terms of operational and cost efficiencies.

31. Looked at from another perspective, it is important to note that current genetic achievements in the country's agricultural technology system have not gone into the level of biotechnology where *genetically modified organisms (GMOs)* are introduced into crops or livestock for increased food production. Thus, judging from its current general performance, Nigeria's agricultural technology system may best be described as still rudimentary in character and traditional in expected accomplishments. Informed observers of the system see this as being due largely to poor funding of agricultural

research and, consequently, the continued dependence of local agricultural scientists on the agronomic and other scientific research findings of their counterparts in international research centers located in the country.

32. However, the sector's inefficiency and non-competitiveness are adjudged to be primarily due to the following major problems:

- Non-involvement of the intended beneficiary farmers at the initial stage of planning and designing the technologies;
- High cost of the final package of technologies for adoption;
- Non-sustainability of these technologies by the farmers because of either the cost of maintenance or the deliberate inclusion of perpetual dependence on the technology developers;
- Poor agricultural extension services available to farmers in the country coupled with the inadequate human capacity development of extension staff who service the agriculture sector;
- Use of a set of technocratic advisors who continually encourage state leaders to develop new and often unachievable policies and program objectives while ignoring those of their predecessors;
- Poor pattern of resource allocation and natural resource use by government which consequently inhibits efficiency and competitiveness in the agriculture sector; and
- Diminishing emphasis on a good work ethic among Nigeria's farm labor. Due to the relatively low pay and comparatively poor reward system in the agriculture sector of the country today, over 90 percent of Nigeria's farm workers are gradually neglecting the old farm work ethic that generated self-propelling initiatives and hitherto encouraged competitiveness and efficiency in the agriculture sector.

B. Relevance of technology in developing Nigeria's agriculture sector

33. Science and technology play a pivotal role in the radical transformation, development, and level of productivity of Nigeria's agriculture. Where these two key determinants are lacking, the agriculture of the country flounders and remains stagnant. As indicated above, the various components of technology in agriculture determine the success or failure of any agriculture. The practice of agriculture in Nigeria today is very different from what it used to be in the early part of the twentieth century and earlier. Growth in human and livestock populations and the resultant increased direct and derived demand for grain, for instance, dictate that agricultural production and productivity must correspondingly increase. Only the use of technological innovations in agriculture to successfully capitalize the country's natural resources can bring about this increase.

34. Current levels of agricultural production and agricultural resource productivity in Nigeria show that there is a large need for improvement. For example, the contribution of primary activities in Nigeria's agriculture to the country's GDP have averaged only 38.45 percent over the period 1981 to 1996 compared to mining/quarrying 13.85 percent, manufacturing 8.35 percent, and distributive and other services 39.35 percent. This is in sharp contrast to agriculture's contribution of over 60 percent in earlier decades. Furthermore, the country's food security index shows that more than 55 percent of her food needs are imported, while its agro-processing industry imports 61.56 percent of the needed agricultural raw materials. Thus, there continues to be an avoidable increasing capacity under-utilization.

35. All these indices point to a critical need for the use and application of improved agricultural technology in Nigeria's agriculture sector. Such technology will have to

relate not only to production, but also to processing, storage and marketing. It is only with the introduction of such technologies that output in the sector can be increased, and farmers' income improved – especially through the marketing of value-added output.

36. Generally, when the agricultural productivity of a country needs programmed improvement, land and labor are saved while the use of capital and purchased inputs is increased. Along with the growth in measured productivity, there have to be some important changes in the structure of agriculture as well as in the nature of farms and farming. A proper adoption and application of new improved agricultural technologies usually leads to the establishment and operation of fewer and larger, more specialized farms as an important element of this structural change.

C. Key players in Nigeria's agricultural technology development & transfer

37. The key players in Nigeria's agricultural technology development industry may be grouped into three broad categories: technology developers, technology disseminators, and technology users – each with a defined mandate to serve the intended beneficiaries. These three classes of players cut across the public and private sectors of the economy.

38. *The agricultural technology developer class* produces a number of desirable technologies such as:

- ❑ Improved breeder and foundation crop and livestock varieties, (seeds, species, cultivars and/or germplasm) for directed biotechnology development;
- ❑ Relevant small-holder hand tools;
- ❑ Fertilizers;
- ❑ Post-harvest processing equipment (especially for cassava, maize and palm produce);
- ❑ Cold storage equipment; and
- ❑ Other simple equipment for household use.

39. Agricultural technology developers in the country fall into two sub-categories, namely: the international and the national research centers. Four *international agricultural research centers* have physical operational locations and presence in Nigeria. These are:

- ◆ International Institute of Tropical Agriculture (IITA) with its headquarters in Ibadan and sub-stations in Kano and Onne (Port Harcourt);
- ◆ International Livestock Research Institute (ILRI) with sizable sub-stations in Ibadan and Kaduna but jointly head-quartered in Nairobi, and Addis Ababa,;
- ◆ West African Rice Development Association (WARDA) with a national office within the IITA complex in Ibadan; and
- ◆ International Crop Research Institute for Semi-arid Tropics (ICRISAT) in Kano.

40. The *national agricultural research centers* collectively constitute what is generally referred to as NARS or NARIs. They are actually a combination of the 20 agricultural research institutes and the 26 universities in the country that have faculties of agriculture involved in agriculture-related research. Each of these national research centers is involved in developing new and improved agricultural technology (foundation and certified seed or livestock, and mechanical equipment for food processing) either individually or collaboratively with international research centers through classical plant/animal breeding, cultivar introduction and improvement, or breeder-seed production. *Appendix 3* summarizes these research institutes while *Appendix 4* contains the list of Nigerian universities with faculties of agriculture and their locations. The

geographical concentration of these institutes has been more a result of deliberate design than political considerations at the time, being influenced principally by the location proximity of these institutes to the then existing universities. The relationship that exists between the international and national research centers within the country is best described as collaborative and complementary partnership.

41. *The agricultural technology disseminator class* is involved in testing, multiplying and releasing/distributing already approved and/or accepted new technologies to farmers. At other times, they engage in further cultivar development and improvement through variety purification and breeder seed production. This disseminator class consists of:

- ◆ Private sector seed distributors; and
- ◆ Public sector agencies and centers.

Unfortunately, existing practice shows that the public sector is more actively involved than the private sector in this component of the country's technology system. For instance, current estimates show that 85 percent of all improved seed and livestock technologies are disseminated to farmers by government agencies such as the State Agricultural Development Programs (ADPs). This is due primarily to the fact that private operators in that sub-sector consider the profit margins on improved agricultural technology distribution to be too low and unattractive. Discussions with private sector technology disseminators reveal that the profit margin they make is, in most cases, less than 10 percent on the average – despite the fact that prices charged for these seeds are relatively high compared to the almost free ones farmers receive from the ADPs. (See *Appendix 5* for prices charged by Premier Seed Nigeria Limited for their field crop seeds). Given the high interest rates (often over 25 percent on the average) paid on funds borrowed from the banks, these low returns on their operations discourage further investment. In fact, as discussed immediately below, only two private sector companies are still actively engaged in the commercial dissemination of improved agricultural seeds in the country. With respect to livestock, there are no special designated disseminators for genetically improved small and large ruminants in the country. It is only in the case of poultry that we have two large-scale improved genetic (parent) stock producers and distributors in the country.

42. *The private sector seed distributors* may be broadly classified into two sub-categories: the formal or organized group, and the informal or unorganized group. The organized group has only two major operators in the country: Premier Seed Ltd. based in Zaria, and UAC Seed Division also based in Zaria; while the unorganized group is made up of Community Seed Development Programs, and Small-scale Seed Enterprises usually owned by enterprising farmers. This class of seed distributors produce and distribute certified and/or authorized seed only. (Appendix 3 contains a list of seeds produced and marketed by these private companies). While the commercial companies (Premier Seed and UAC) sell their seeds at relatively high prices, the Community Seed and Small-scale Seed Enterprises produce and distribute seeds/cultivars to their members at no extra cost than the labor they may have had to contribute to the cooperative production.

43. *The public sector seed distributors* are the state agricultural development programs (ADPs), the Crop Variety Release Committee, the National Seed Service, and the Plant Quarantine Services. *The ADPs* are state-based programs established primarily for carrying out extension services to farmers in their respective states. Every state in the federation has an ADP – although some are almost folding up. In addition to providing extension services, state ADPs produce and distribute certified and authorized seeds using appointed out-growers in their states, and also carry out seed promotional

programs. *The Crop Variety Release Committee* is a statutory body established by two decrees (33 of 1987 and 72 of 1992) to oversee all operations required for the release of new cultivars to Nigerian farmers. While Decree 33 combined crops and livestock under the same committee, Decree 72 separated crops from livestock, and increased the crop committee's responsibilities to include cultivar testing and evaluation through multi-location trials of nationally coordinated research projects (NCRP). *The National Seed Service* is an agency of the federal government charged with the responsibility of:

- ◆ Receiving the few publicly-bred "breeder seed" from the international and national research stations and using them to produce the first progeny as foundation seed; and
- ◆ Ensuring seed testing, quality control and the general certification process.

The Plant Quarantine Services constitute the federal department responsible for ensuring that foreign plant and animal pests and diseases are prevented from entering the country. In addition, the department provides local quarantine services for controlling pest and disease outbreak of epidemiological magnitude in the country.

D. Process of agricultural technology transfer to farmers

44. The exact process of transferring technologies from the developers to the end-users is summarized in *Figure 1* and described below.

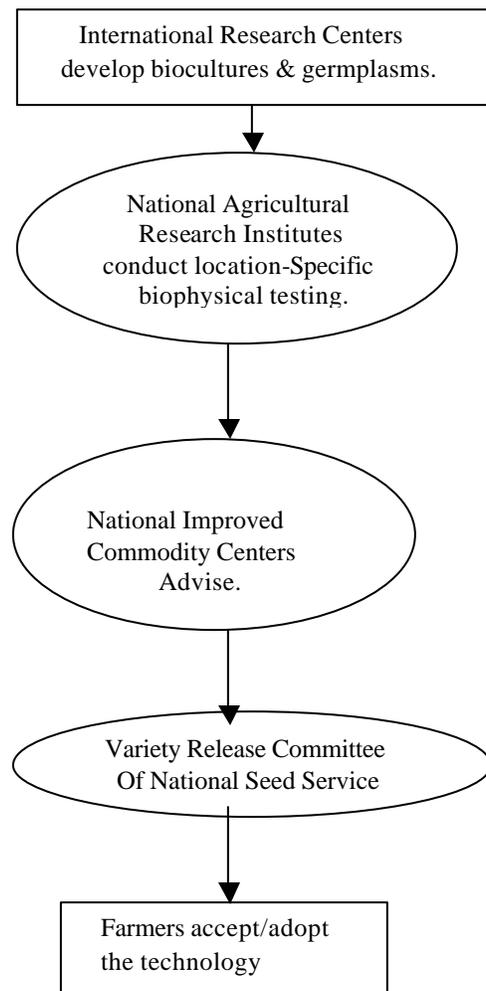


Figure 1: Process of agricultural technology transfer from developers to farmers in Nigeria

45. As summarized in figure 1 above, the process of technology transfer (using crops as an example) involves giving national research centers the improved biocultures or germplasms that have been developed at the international centers for location-specific biotic and abiotic testing and adaptation. It is after such biophysical testing under different agro-climatic ecologies and socioeconomic environments that the National Agricultural Research Institutes (NARIs) then advise the National Improved Commodity Centers to authorize the Variety Release Committee of the National Seed Service (NSS) to disseminate the new technology to farmers. Usually, this process takes about *six years* before a new improved crop variety or livestock species is released into the agricultural system of the country. In some instances, however, this long period of testing and selection is shortened to three years by the scientists/breeders in the international and national research centers working together directly and in partnership with farmers from the early stage of selection of the desirable qualities in the crop/livestock variety. This farmer participatory program is already being adopted in Nigeria by international centers like WARDA and IITA.

46. A critical analysis of the process involved in Fig 1 shows the following facts:

- i. The period of time (six years) that it takes in Nigeria to deliver a new technology from its generation/development to its actual availability to the end-user/farmer is too long. In countries like the US, Thailand, Japan, China and India where agricultural technology generation and technological developments are known to influence agriculture most positively, this time lag is usually less than two years. Unnecessary impediments are usually removed in the course of transferring these technologies to the intended beneficiaries;
- ii. This delay in technology transfer to farmers is largely due to the fact that over 98 percent of the agencies involved in developing, commercializing and finally transferring these technologies are public entities. Involving more of the private sector in technology development and transfer within a country has been known to contribute to a faster green revolution throughout the world;
- iii. As presently constituted, farmers are generally brought into the process of technology development too late in the process. There is need for them to be involved right from the early stages of the technology conceptualization, identification and selection so as to include variety qualities desired by the farmers and known to be acceptable in the target agro-ecological zone. Such a participatory process greatly shortens the lengthy discussion and trial periods often required after scientists have developed the technology in isolation; and
- iv. Bureaucratic discussions within each of the public agencies handling technology release approvals (especially the National Improved Commodity Centers, the Variety Release Committee, and the National Seed Service) and shuffling between them adds avoidable time to the observed delay in this technology transfer process. Collapsing their debates to joint sessions could save very valuable time in this technology dissemination process.

E. History of improved seed development in Nigeria

47. The genesis and history of improved seed development in Nigeria have followed a phased program jointly funded by the UNDP, FAO and the Government of Nigeria since 1975. The building of a sound seed industry program was initiated in 1975 when FAO and UNDP funded a project on “improvement in seed production and quality control”. This was followed by a second phase in 1981-85 funded by the Government of Nigeria

under a unilateral trust fund management to focus on the “strengthening of foundation seed production”. A third phase focusing on “improvement of quality seed” covered 1985-87 and was funded by UNDP/FAO under a financial and technical assistance agreement. It is these three projects that formed the sound foundation for Nigeria’s improved seed program.

F. Principal constraints in the agricultural technology system of Nigeria

48. The technology development system of the country has not been favored by an effective implementation of agricultural policies and programs that use improved technologies. Furthermore, in addition to the seven major problems earlier identified as contributing to the inefficiency and non-competitiveness of the country’s agriculture, there are seven specific and related problem areas that critically constrain development of the agricultural technology system in Nigeria, and which, together, seriously hamper agricultural development in the country. These related problem areas are:

- Policy inconsistency and related constraints;
- Constraints of both price and non-price competitiveness associated with certain crops in relation to external trade within the ECOWAS sub-region or in the world at large;
- Poor information dissemination constraints;
- Constraints of insufficient funding;
- Constraints of environment-related issues;
- Market development constraints; and
- Constraints of politicization of technology development.

49. Policy inconsistency and related constraints in the country generally results from the frequent changes in government administrations. From 1960, the year of her independence, until 1987, Nigeria used unarticulated administrative and often on-the-spur-of-the-moment political pronouncements to guide the operation of its agricultural activities. It was not until 1988 that it finally dawned on the federal government that there was a need to have a formal and well-articulated policy framework that would systematically guide the development of the agriculture sector of the economy. But even with the production of a national agricultural policy document in 1988, the general attitude toward policy continuity by succeeding administrations has continued to be a problem. With each new administration since independence, the tendency has always been for policies and programs in the agriculture sector to be changed without recourse to existing or past efforts/attempts on the same matter. Succeeding government administrations refuse to continue with policies of their predecessors. Instead, they establish new ones that, in most cases, run counter to former ones and, therefore, confuse the implementers.

50. Generally, policy inconsistency and related constraints that have plagued Nigeria may be delineated into three categories that cause:

- *Low technology adoption rate* which in turn is due to:
 - High cost of available technology,
 - Poor extension service linkages with farmers,
 - Inaccessibility of necessary financing, and
 - Poor development of agricultural input/output markets;
- *Poor financing of agriculture and agricultural technology development* by both the private sector and all tiers of government (since agriculture falls in the concurrent list); and
- *Low level of scientific and managerial capacity development* in such critical areas of agriculture as:

- Technologies that increase and/or restore soil fertility,
- Technologies that increase soil moisture especially in those productive but dry areas in the northern Savannah,
- Improved seed production technologies,
- Post-harvest technologies,
- Food storage, marketing and distribution technologies,
- Institutional capacity building (in such areas as critical mass creation, institutional management, general analysis, resource management, and legal and enabling policy environment development), and
- Physical, social and economic infrastructure building especially in market information generation and management, trading and financial arrangement.

51. Constraints of price and non-price competitiveness in Nigeria's agriculture are caused by different factors. Price-wise, Nigeria's agriculture is mostly non-competitive at the global market level. There are, however, a few crops and their technologies (such as yams and cassava) that are price-competitive within the ECOWAS sub-region. The general *price non-competitive* aspect of Nigeria's agriculture sector is due to three principal elements pervading the country's agricultural market. These are the facts that:

- Farmers in the country typically operate in a market situation where the majority of essential infrastructure (electricity, water, telecommunications and transportation) that influences agricultural prices is public monopolies. Pricing under these monopolies is not market-determined and is generally always high. Consequently, farm input prices are high and farmers become price takers for these inputs that determine their costs of production. Relative to their counterparts in other countries where farm inputs are cheaper, the agricultural products of Nigerian farmers are therefore not competitive;
- Free entry into and exit from the sector by mostly poor and illiterate rural peasants or non-serious retirees make prices of agricultural products in the country adequately reflect opportunity cost, and so, in the long run, output prices are the same as average production costs of the farm firms – which are normally high; and
- In most cases, the agricultural produce of Nigerian farmers is of inferior quality than those from other countries. Due to poor standardization of both processed and non-processed agricultural produce from the country, Nigeria's agriculture sector is not price-competitive.

52. On the other hand, *non-price competitiveness* is caused by factors other than the prices of inputs and outputs in the sector. In Nigeria, non-price competitiveness is due mainly to the agriculture sector's low resource productivity which itself is caused by inadequate human interventions by Nigerian farmers and non-farmers at various strategic points in the farm production/processing/distribution continuum. These inadequate interventions usually result from:

- Poor human capacity of Nigerian scientists in truly demand-driven and applied biological or agronomic and socio-economic research;
- Often irrelevant and farmer-unfriendly policy formulations and analyses;
- Insufficient attention of government and the non-agriculture organized private sector to the development of farm input/output markets;
- Farmer-sensitive program design and implementation in agriculture;
- Farmers' frequently negative attitude towards available new improved agricultural technologies because of their high package cost and the fact that

they were not carried along as partners during the technologies' design and development; and

- The country's frequent administrative impatience in following through past well-articulated agricultural policies and programs because of ill-advised political haste to score a cheap point or the desire of assigned program implementers to steal budgeted funds.

Taken together, the above price and non-price factors have seriously hampered the development of agricultural technology and given the agriculture sector a bad name in the country.

53. With respect to human capacity development in particular, it is important to note that this shortcoming is caused partially by insufficient training and the non-supplementation of such training with adequate exposure to conferences or workshops, and partially by poor funding of national research centers. Available evidence shows that Nigerian scientists work continuously for over ten years without ever having any scientific interaction with their counterparts outside the country through conferences and workshops. Many do not carry out research and so cannot write papers on issues of present day relevance. Consequently, many of them are out of touch with the scientific realities of the dynamic world in which they operate.

54. Furthermore, their reward system is relatively poor. Salaries and incentives are low often not paid regularly. There are no research funds made available to them for their research, and there is no national direction in the type and depth of research expected of them. There is no national research framework or blueprint to systematize research efforts throughout the country. As a result, many research scientists in these centers just "float" and wait for the end of month to draw their salaries - if paid. Many get frustrated and leave the service through the phenomenon that has been referred to as "brain drain". Current estimates show that Nigeria has lost an estimated 35 percent of her highly trained manpower in many relevant fields to external brain drain and about 15 percent to internal brain drain (Ikpi, 1999). While external brain drain takes such trained personnel to "greener pastures" in countries where their services are appreciated and better rewarded, "internal" brain drain occurs within the country. It results from politically motivated deployment of well-trained individuals to wrong jobs where they do not contribute positively and meaningfully to the economy because they know nothing of such new assignments, but are just placed there as agents for high level fraud, grand theft and larceny.

55. Poor information dissemination constraints within the agriculture sector are caused primarily by five interwoven factors, namely:

- Government's poor allocation and distribution of funds to support agricultural technology and information dissemination to farmers. Statistics show that over a 14-year period of 1980-1993, the Nigerian government spent only 1.45 percent of her entire agriculture GDP or about 0.1 percent of her entire annual budget on agricultural research (Ikpi & Ikpi, 1998). The fraction of that amount that was spent on technology development and agricultural information dissemination was negligible. This suggests a serious lack of foresight and culpable negligence on the part of policy makers in the country;
- Inadequacy of existing agricultural extension system to cope with identified agriculture sector problems in the country. This inadequacy is caused by insufficient financing of the system, generally poor resource provision for the extension staff,

misapplication of the meager resources made available to the system by management, ineffective policies, and non-implementation of existing policies. The problem of misapplication of funds by extension managers in the system is one of the main reasons for the World Bank withdrawing its financial support for and contribution to the extension system under the agricultural development program arrangement;

- Low level of development of information and telecommunication infrastructure in the country. As indicated above, this is primarily due to government's support for the existence of an incompetent public monopoly to run this national infrastructure;
- High level of illiteracy among Nigerian farmers that prevents them from constituting a political power bloc to challenge government's consistent neglect of the agriculture sector; and
- Complete absence of any organized support (especially that of the media) to speak on behalf of farmers and agricultural technology developers for adequate public- and private sector attention and meaningful development policies for the sector.

56. *Constraints of insufficient funding of agriculture* in Nigeria have over the years been recurring. Available records show that, although agriculture is in the concurrent list (which under normal circumstances would imply more adequate attention to and sustained funding of agriculture by federal, state and local governments), it is a relatively neglected sector in terms of productive investment. Furthermore, private-sector investors see agriculture as an unrewarding sector when it comes to quick profit-making, while government looks at agriculture as purely a small-farmer enterprise. Consequently, less than 1 percent of Nigeria's GDP is annually effectively plowed back into agriculture as productive investment. In fact, the country *spends less than one half of a percent* of her entire annual budget on agricultural research. In most years, the actual amount finally expended on research is only 55 percent of what is actually budgeted or 30 percent of what was originally requested for by the national research establishments (Ikpi & Ikpi, 1998). In other words, Nigeria spends, on the average, less than one-third as much of her agricultural GDP on research as do developed countries like the US or Germany, although agriculture constitutes more than ten times as large a share of her GDP. Given the size of Nigeria's agriculture, this level of funding falls far short of the minimum needs. Informed estimates based on minimum desirable impacting suggest that Nigeria should spend annually 10 percent of her GDP or alternatively, at least 12 percent of her annual budget on agricultural research and technology development. Such an amount will not only ensure sustained development but also increase productivity and competitiveness of the sector.

57. *Constraints due to environmental considerations* affect the development of the agricultural technology system in three major ways:

- By limiting the establishment of research sub-stations and trial farmer plots of scientists from international and national research centers, and so limiting extension efforts into certain areas of the country;
- By not developing specific technologies suited to each environment because policy makers and scientists do not look at environmental considerations beyond natural resource management and conservation; and
- By not considering the implications of other aspects of environment, (namely: economic, social and technical).

Environmentalists estimate that soil pollution, erosion, soil degradation, deforestation and desertification drastically reduce the quantity and quality of farmland available for agricultural production in the country at an average annual rate of 3 percent of the total land area of the country (Ojo, 1998). This is a serious problem that requires urgent attention and reasonable investment by the government in efforts to arrest environmental degradation of agricultural land.

58. Market development constraints in the country's technology system fall into five areas. They include those of:

- Inadequate organization of the private sector for handling technology transfer and commercialization;
- Non-competitive pricing system that is currently used for transferring improved technology;
- Non-existence of sufficient farmer groups/organizations that can collectively bargain for their rights with technology disseminators;
- Inadequate capitalization of both the public agencies and private-sector companies that currently handle technology dissemination to farmers; and
- Poor state of infrastructure and service industries associated with the handling, storage and distribution of improved agricultural technologies.

Each of these problem areas is accentuated by the gross inadequacy of the enabling environment that is specifically intended to encourage agricultural technology development, transfer and commercialization in the country.

59. Constraints relating to the politicization of technology development in the country arise as a natural consequence of the location distribution and crop mandate specification of the national research centers in the country. Political considerations relating to technology development and transfer initially set in through the recruitment and deployment of staff, management and operations of these agricultural technology development centers. Later, depending on who was in control of the government, this politicization spread to deliberate and selectively biased budget allocations and release of funds to these centers for necessary technology research and development. Consequently, while some centers in certain parts of the country were well funded, others were deliberately starved of funds. This later led to poor staffing, and either the total collapse or stagnation of such centers. The overall effect of this single constraint on technology development has been most devastating on the technology industry because of its many-sided ramifications of incomplete technology development, neglect of some technologies that should have contributed positively to Nigeria's agriculture, and cooperation among Nigerian research scientists.

G. Major opportunities in the agricultural technology system of Nigeria

60. Following from the principal constraints listed above, major opportunities that readily present themselves in the agriculture technology system of Nigeria can be seen to be purely demand-driven. They flow from those areas of need that technology users indicate as limiting their production and productivity as well as the level of value added that could be meaningfully generated in the agriculture sector. These opportunities include:

- Increased private-sector participation in the effective multiplication and dissemination of already existing and acceptable production technologies to farmers at reasonable and competitive prices;
- Establishment and operation of effective and functional private-sector micro-credit/finance organizations that target farmers with the aim of ensuring increased

and sustained accessibility to improved technology for production, processing, storage and marketing;

- ❑ Formulation and systematic adoption of an agricultural technology development agenda by a competent team of Nigerian agricultural scientists working closely with government policy makers/implementers to create new roles for NARS participants;
- ❑ Sustained investment in agro-industrial processing enterprises and marketing arrangements that support farmer organizations; and
- ❑ Support for local private-sector fabrication of necessary processing machines, tools and equipment for the agro-industry that will absorb the increased output flowing from the adoption and use of available improved production technologies.

H. Currently available agricultural technologies in Nigeria

61. Databases of the four international and twenty national research centers in the country show that there are thousands of improved agricultural technologies that have been developed for Nigeria's agriculture. These technologies may be classified into:

- (a) *The biologic type* – which comprises improved crop varieties or livestock species or germplasm specially developed for revolutionary agricultural production increases;
- (b) *The engineering type* – where there are those improved mechanical technologies comprising production, processing and marketing machinery and equipment for improved cultural operations in the three sections of the agricultural continuum; and
- (c) *The operations type* – which incorporates the cultural operations and farming activities that are packaged along with the improved biologic type for increased agricultural productivity.

Many of these technologies have already been released to the national agricultural production system; few others whose development has been completed are on the “shelf”; while some more are still in the technology system's pipeline at different stages of development. Those technologies that have been released from among the three typologies above into the national agricultural research and farming systems are discussed on group-by-group basis.

62. *For the crop biologic types*, Nigeria's agricultural technology system has the following improved crop varieties available for farmers' adoption and use in the country's farming system.

- ❖ There are 18 improved ***cassava*** cultivars already developed by the International Institute of Tropical Agriculture (IITA) and the National Root Crops Research Institute (NRCRI). The detailed technologies in this group are presented in *Appendix 12*. All 18 cassava varieties have been released into the national farming system, but only five [TMS 30555, TMS 30572, TMS 4(2)1425, TMS 50395, and NR 40144] may be described as widely adopted in the southern cassava belt of the country. Among these five varieties, TMS 30572 and TMS 4(2)1425 are the most popular and dominant in the field because of the ease of their availability through government distribution agencies and their partners. Many of the already released varieties are yet to be multiplied and made available to farmers. Furthermore, farmers are yet to develop the ability to preserve cassava stem cuttings of these varieties for future planting. In addition to the above genotypes or germplasms, IITA has developed some cassava-related technologies listed in *Appendix 7*.
- ❖ There are 70 improved ***soybean*** varieties that have been developed for use in the Nigerian farming systems. The varieties are listed in *Appendix 8*. According to IITA soybean breeders, the desirable qualities that make farmers/growers in the country accept these 70 soybean varieties are the following:
 - ◆ They have promiscuous nodulation and increased seed longevity;

- ◆ They possess resistance to pod-shattering and disease;
- ◆ They contribute to productivity and sustainability of maize/grain legume cropping systems;
- ◆ They maximize the percentage of P-use efficiency or tolerate low P;
- ◆ They possess ability to cause suicidal germination of *Striga hermonthica*;
- ◆ They contribute greatly to increased fodder yield; and
- ◆ They are early maturing.

In addition to the soybean genotypes listed in *Appendix 8*, some soybean-related technologies have been developed by IITA. These are:

- A. Serological diagnostics for cowpea viruses and cowpea bacterial blight.
- B. Detection methods for *Macrophomina phaseolina* in plants and seeds.
- C. Simulation model for cowpea growth including interactions with trips.
- D. Use of botanical pesticides in the field and in storage.
- E. Improved storage techniques using solar drying
- F. Cowpea pathology.
- G. Improved intercropping system (strip cropping) for 2 rows of millet or sorghum with higher density: 4 rows of cowpea with higher density.
- H. Improved cowpea genotypes (as already listed above).

- ❖ There are altogether 126 improved varieties of **cowpea** that have been developed for dissemination to farmers in the country. Based on the special qualities they possess, they are classified into ten distinct groups. These are summarized in *Appendix 9*.
- ❖ There are 68 improved **yam** varieties made up of 44 breeder clones of *Dioscorea rotundata* and 24 hybrid clones of *Dioscorea rotundata* that have been developed and released. These are listed in *Appendix 10*. These various clones have different desirable qualities (with respect to tuber yield, resistance to disease and infection, and wide soil-type compatibility) that make them attractive and acceptable to the farmers.

In addition to the above-listed improved yam genotypes, IITA has developed some other yam-related technologies that increase productivity for farmers. These are:

- ◆ Mini-sett technology for rapid propagation of planting materials
- ◆ Tissue culture for virus elimination and micro-propagation
- ◆ Production of nematode-free planting materials using hot water therapy
- ◆ Diagnostics for yam viruses
 - Extension of tuber dormancy using gibberellic acid
 - Production of certified mini-tubers for international distribution
 - Improved varieties and seed populations (as listed above).
- ❖ There are 11 improved **banana and plantain** varieties that have been developed and disseminated to Nigerian farmers. These 11 varieties are grouped into four types and are summarized in *Appendix 11*. All the varieties are mainly grown in the southern ecosystems of the country.
- ❖ There are altogether 36 improved **maize** varieties already developed and extended to farmers throughout the country. 29 of these are developed by IITA in Ibadan, while the remaining 7 are developed by IAR in Zaria. Based on soil-type adaptation and agro-ecological zoning, the 29 varieties developed by IITA are grouped into 77 categories as summarized in *Appendix 12*. The seven improved

maize varieties developed by the Institute of Agricultural Research (IAR) in Zaria are summarized in *Appendix 13*. All seven varieties have been released into the farming system, and are widely adopted by maize growers in the North.

- ❖ There are five best lines or varieties of improved *rice* that have been developed by WARDA for Nigeria. These are:
 - WAB 450-I-B-P-163-41
 - WAB 450-I-B-P-33-HB
 - IRAT 144 (released in 1986 as FARO 39)
 - WAB 450-24-2-3-P33-HB
 - WAB 35-2 Fx.

These five best lines have been accepted by farmers and respond well to fertilizers. All five varieties are being extended by the National Cereals Research Institute (NCRI) that has the mandate for generating rice technologies across the country in collaboration with WARDA. In addition, NCRI has developed about twenty varieties from among which two (WITA 1 and WITA 4) are widely used. Two other improved varieties (IR1416 and BG90-2) have been adopted in the eastern parts of the country.

63. The degree of adoption of each of these crops is largely determined by the ease of processing into final products and the availability of markets for human or industrial consumption of the end product. It is also affected by the cost of the entire technological package that determines whether or not the exercise is feasible. These two points have, in the past, greatly determined the level of adoption of developed technologies. The non-provision of markets for the final agricultural products resulting from these technologies has been the singular most important determinant of technology adoption in the country. Past policies that did not take this aspect of technology development and adoption into account proved ineffective and irrelevant.

64. For the engineering technology type, the following agricultural processing equipment have been fabricated/developed by the Nigerian Rural Industrial Development Scheme (RAIDS) for farmers in the rural areas of the country:

- ◆ Cassava processing plants;
- ◆ Fruit-juice making equipment;
- ◆ Palm oil extraction equipment;
- ◆ Soybean processing equipment; and
- ◆ General grain-milling equipment.

Other simple technologies have been designed and their prototypes produced by the Department of Food Technology in the University of Ibadan. These include:

- Yam pounding machine for home and industry use;
- Simple solar dryer for drying flours made from yam (“elubo”), plantains (“elubo”), and cassava (“lafun”);
- Simple fish smoking equipment for SMEs that make such fish free from dust and sand contamination; and
- Jam processing equipment using different fruits.

The Food Technology Department in Obafemi Awolowo University at Ile-Ife has also successfully designed and fabricated simple screw-press equipment prototypes that can be used by SMEs to *extract* and *purify* oil from seeds such as palm kernel, groundnuts and melon. The department also indicates that they have designed fruit juice extraction equipment for use by SMEs for pineapple, oranges, guava, mango, and papaya (pawpaw).

65. Unfortunately, neither the government nor the private sector is doing anything to encourage a massive production of these developed prototypes for commercialization to rural end-users. So, although a few of these processing technologies have been successfully disseminated to rural areas in the country and are being used alongside their imported counterparts, they are not produced in sufficient quantity because of lack of funds. In terms of their economic potential, the relative cost of the equipment makes them affordable and within the reach of rural farmers. The use of diesel oil or gasoline as alternative source of power for these technologies also takes care of the absence of electric power in the rural areas. Furthermore, the availability of these agro-allied technologies has generated rural employment for rural youths. The efficient performance of these machines is reported to have saved rural farmers time spent on hand processing of their farm produce, and consequently increased their leisure time and operating profits.

66. Other research centers like IITA have, on their part, also developed a number of post-harvest and other technologies that are either “software” (processes) or “hardware” (equipment for use at both the production and processing ends of farmers’ activities). These are:

- ◆ *Under “software” technologies* - three processes:
 - d. Cassava bread recipe;
 - e. Production of soy-cheese using plant coagulant; and
 - f. Cottage, small-scale level processing of soymilk for the production of beany-odour-free soymilk.
- ◆ *Under post-harvest “hardware” technologies* – 41 simple (often hand-operated) processing equipments have been developed. These are summarized in *Appendix 14*.

67. *For the farming operations type technologies*, improved cultural practices that have been adopted within the farming systems of the country are specific to ecological zones and physical environments. Usually developed by systems’ agronomists in the state Agricultural Development Programs (ADPs), NAERLS in Zaria, and IITA’s Resource and Crop Management Division develop this group of technologies. For each given improved crop variety, the farming activity/operation technologies are a package or a combination of desirable activity improvements that enhance the crop’s productivity. They usually include:

- The crop system or combination that supports the new variety best;
- The recommended spacing of the crop plantings;
- The correct fertilizer application level; and
- The weed control method that goes with the system.

Agricultural technologies in this category are normally not necessarily static or permanently fixed. The exact combination of the factors that make up the package changes although the composition of the technological package may remain the same. Ecological and environmental circumstances dictate that technological packages in this group be dynamic, changeable. They have to be determined each time they are needed based on the location where they are to be used. When correctly implemented, such operations technologies lead to a certain minimum expected yield of the new crop variety in the prescribed location.

68. Other farm operations technologies developed in IITA include:

- ◆ *General plant health:*
 - a. Biological control of mango mealy bug
 - b. Biological control of aquatic weeds
- ◆ *General soil management:*
 - a. Vetiver grass contour line planting
 - b. Acacia auriculiformis improved tree fallow
 - c. Alley cropping with tree species
 - d. Mucuna cover cropping

The availability of all the above-mentioned technologies makes it possible for agricultural production, processing and marketing in the country to be improved by projects targeted at increasing farm incomes and recommended in the conclusion.

III. POLICIES AND PRACTICES AFFECTING PRIORITY SETTING IN NIGERIA'S TECHNOLOGY RESEARCH AND DEVELOPMENT (R&D)

69. Nigeria's agriculture sector development and productivity have been largely hampered by the fact that the country does not have an agricultural technology development agenda. Activities in the technology sub-sector of agriculture have been conducted on trial and error basis. Most actions undertaken in the sub-sector have been ad-hoc and discretionary, unsystematic and non-sequential. Thus, there has been no priority setting process with respect to technology R&D on the part of both public and private sectors. Although it sees the need and possible high dividends of research and development in technology, the organized private sector has nothing pressuring it into investing in the enterprise. The Nigerian government has no regulations or laws that make it mandatory for private companies in the country to invest a specified amount of their gross or net income in technology research and development.

70. This low level of mandatory encouragement of the private sector to invest in agricultural technology development is not unconnected with the constant and sometimes unexplained confusing changes that take place with respect to the federal agency responsible for overseeing the affairs of agricultural technology development, use and expansion. For example, in 1970, a Nigerian Council for Science and Technology Development (NCST) was established by a federal military decree and charged with the responsibility of:

- Establishing priorities in science and technology in relation to economic and social policies of Nigeria and her international commitments;
- Advising the federal military government on national science policy, general planning and financial allocations to all research institutes, results of scientific activities in the development of agriculture, industry and social welfare;
- Ensuring coordination and cooperation among the various agencies involved in the formulation of science policy; and
- Promoting public confidence in scientific expenditure as well as creating an atmosphere conducive to scientific activities.

At the time that NCST was established, there were only eleven federal agricultural research institutes operating in the country.

71. In 1971, the Agricultural Research Council of Nigeria (ARCN) was established. In January 1977, the federal military government replaced the NCST with the National Science and Technology Development Agency (NSTDA). Its functions were very similar to those of the erstwhile NCST, but its chairman (the Chief of Staff Supreme Headquarters) was now a member of the Federal Executive Council (FEC) or Cabinet. The NSTDA functioned for almost three years before it was abolished in October 1979 and superseded by the federal Ministry of Science and Technology (FMST) under the post-military civilian regime of President Shehu Shagari. Under this setup, all scientific and agricultural research in the country was conducted under the control and administration of this new ministry. The particular section of the ministry that was charged with the responsibility of ensuring coordinated scientific and technology research in agriculture was NACENI. A director headed NACENI. One early morning in 1994, all staff of NACENI were moved (without any explanation to anybody) from the FMST and placed under the federal Ministry of Agriculture (FMA). The director of NACENI had to move from Lagos to Abuja within two days. That is how things have been since then, although the federal Ministry of Science and Technology still exists. The conflicts of

interest between FMST and FMA still remain and have contributed in no small measure towards the haphazard attitude displayed towards agricultural technology development.

72. In addition to the above, there have been *other policies and practices* that have greatly affected agricultural technology development and transfer in the country. For example, Evenson reported in 1992 how agricultural extension advisors swarmed the country in the early 1950s, bringing U.S. and European agricultural technologies to farmers. But by early 1960s, it became clear that imported U.S. know-how, including virtually all aspects of agricultural technology – varieties, machines, and even chemicals – was simply not transferable to environments that differed greatly from those for which it was developed. This led to a modification of that earlier farm development strategy.

73. International agencies in the country have, for the most part, pursued a bifurcated strategy over the past two decades. Within that period, emphasis on technology transfer continued in the form of “rural development” projects that received the bulk of development aid. These projects varied greatly in nature but often had a technology transfer component. A component of the strategy has, however, always supported agricultural research in the country. This research development strategy has primarily been in the form of building international research centers. In recent years, a number of national research programs have also attained significant research capacity and current international policy is slowly shifting toward further strengthening of these programs. New improved agricultural technologies are introduced in packages with several components such as high-yielding crop varieties, fertilizers and some corresponding land preparation practices. While a component of a package may complement another, some of them can be adopted independently. Thus, farmers may face several distinct technological options. They may adopt the complete package of innovations introduced in the country or subsets of the package that can be adopted individually. However, at the receiving end, there are socioeconomic factors that can impact positively or negatively on the smooth transfer and adoption of improved agricultural technologies. Examples of these factors are farm size, risk and uncertainty, labor availability, credit, land tenure and water supply constraints.

A. Policy on input delivery system

74. Government policy on agricultural inputs was not clearly defined until during the Third National Development Plan period, 1975-80. Before that time, input supply and distribution were in the hands of regional governments and parastatals that operated through specified commodity-marketing boards to meet the needs of their farmers. The operations of the regional supplier were limited in scope and confined to certain cash crops such as cotton and groundnut in the north, cocoa and rubber in the west and mid-west, and oil palm in the east. Growers of these crops were given improved seeds, credit facilities and advisory services while their counterparts in the food crops sub-sector did not receive such attention. This was deliberate policy to promote cash crops as foreign exchange earners for the government. However, with increasing food import bills, there came the need to organize input delivery systems better in order to enhance agricultural productivity. Hence, in the third National Development Plan, agricultural inputs that were to be supplied and distributed by the federal and state governments were clearly spelt out (Akanji, *et al*, 1999). A key element of the policy intervention in agricultural inputs then was the administration of subsidy aimed at promoting the use of improved inputs and technology. The subsidies covered a wide range of farm inputs including fertilizer and improved planting materials, farm equipment and machinery, as well as

vaccines and drugs for livestock. In addition, subsidies also extended to other agricultural services including bush clearing and land preparation through tractor hiring programs, provision of irrigation, credit schemes and agricultural research and extension services.

B. Local and international market information system

75. Market information from within and outside the country is very important in agricultural production. Consequently, the Nigeria Export Promotion Council was established in 1976 to publicize and promote Nigeria's agricultural exports in collaboration with Nigeria's Trade Missions overseas. In addition, the council periodically reviews the export trade policies of the country and assists the government in identifying export-oriented industries with the aim of determining export size targets for various categories of goods. Nigeria's Export/Import Bank (NEXIM) established in 1991 is statutorily required to provide funds in local and foreign currency to exporters. It is also required to provide risk-bearing facilities in support of exports in the form of credit guarantee and insurance investment guarantee, investment insurance of market risks such as price, exchange rate and interest rate risks. The Bank also provides market information and exporter education and collaborates with the Nigeria and International Trade Promotion Institute to create an environment favorable to exporting and trade fairs (Ojo, 1994).

C. Financial support system

76. In Nigeria, financial support is primarily provided to the farmers in an indirect way, namely: through subsidy and financial credit administered by commercial, merchant and specialized banks. Through the subsidy program many inputs the farmers use in their production activities are made available to them at below cost. These farm inputs cover a wide range including fertilizer and improved planting materials, farm equipment and machinery, as well as vaccines and drugs for livestock. As mentioned earlier, subsidies also extend to other agricultural services including bush clearing and land preparation through tractor hiring programs, provision of irrigation and agricultural research and extension services. Financial support targeted at the farmers comes in form of cheap credit that various banks are obligated to provide to the farmers. This was made possible by various government policies guiding the administration of loans in Nigerian banks.

- i. *Concessionary interest rate policy* made it possible for farmers to borrow money from banks at an interest rate that is lower than the current market rate. The Central Bank of Nigeria (CBN) often fixes lower interest rates for agricultural loans than for loans flowing into other less preferred sectors. These rates were about 4 and 6 percent lower than those for less preferred sectors.
- ii. *Loan portfolio requirement guidelines* emanate from the Central Bank of Nigeria (CBN) and prescribe to Commercial and Merchant Banks the minimum percentage of their credit funds to be allocated to the agriculture sector. They have varied from 4 percent in 1972 to 12 percent in 1985 in respect of Commercial Banks and from 4 percent in 1977 to 6 percent in 1985 in respect of Merchant Banks (*See Table 1*). Table 1 shows that the growth rate of commercial bank loans to the agriculture sector fell for seven years from a peak of about 113 percent in 1976 to an all time low of about 6 percent in 1983. Merchant bank loans to agriculture however grew but at a decreasing rate from 100 percent in 1977 to 48 percent in 1979, and from a peak of about 155 percent in 1980 to an all time low of about 36 percent in 1983. The exceptional growth rate in 1980 is attributed to the use of moral persuasion by the then government

administration to increase agricultural lending in support of the newly introduced Green Revolution Program. Although the growth rate of agricultural loans has been positive, the share of agriculture in total bank loans in all banks has been below the minimum level stipulated by the CBN between 1972 and 1985.

Table 1: Average growth rates of bank loans under CBN Guidelines, 1970-1985

Year	Growth Rate of Agric Loans (%)		Share of Agric in Total loans (%)		Prescribed Minimum % to Agriculture		Deviation from Prescribed min.	
	Mer- chant Bank	Commer- cial Bank	Mer- chant Bank	Commer- cial Bank	Mer- chant Bank	Commer- cial Bank	Mer- chant Bank	Commer- cial Bank
1970		59.1		2.0				
1971		31.4		1.8				
1972		118.7		3.1		4.0		-22.5
1973		12.5		2.9		4.0		-27.5
1974		25.9		2.9		4.0		-27.5
1975		37.5	1.0	2.4	6.0	6.0	-83.3	-60.0
1976	77.8	112.8	1.7	3.8	6.0	6.0	-11.7	-36.7
1977	100.0	74.7	2.9	4.5	4.0	6.0	-27.5	-25.0
1978	62.5	61.0	2.7	5.5	4.0	6.0	-32.5	-3.3
1979	48.08	47.1	3.4	7.1	5.0	6.0	-32.0	+18.3
1980	154.5	40.2	4.9	7.3	5.0	8.0	-2.0	-8.8
1981	45.9	38.9	4.0	6.9	5.0	8.0	-20.0	-13.8
1982	40.2	33.2	3.9	7.7	5.0	8.0	-22.0	-3.8
1983	35.9	6.4	3.7	8.5	5.0	10.0	-26.0	-15.0
1984	45.5	11.9	4.7	9.1	5.0	10.0	-6.0	-9.0
1985	51.6	24.5	6.7	10.8	6.0	12.0	+11.7	-10.0

Source: CBN Economic and Financial Review and CBN Annual Reports and Statement of Accounts (various issues).

D. Import/export policy affecting improved agricultural technology transfer

77. Over the years but especially from the introduction of the structural adjustment program (SAP) in 1986, there has been a deliberate import policy known as the Duty Drawback Scheme that has been used to encourage technology transfer. This scheme makes provision for the reimbursement of customs duty on imported inputs used for export production. The operating agencies of this scheme are the Nigeria Export Promotion Council (NEPC), the Customs Department, Banks, Central Bank of Nigeria (CBN), and the Standards Organization of Nigeria (SON). The fund meant for this scheme has been increased to N50 million.

E. Impacts of trade liberalization policies, 1980 to 1999

78. A number of policy impacts are traceable to the liberalization policies that have been implemented by the federal government of Nigeria since 1980. These impacts are specifically those on areas related to agriculture and technology transfer. These areas are:

- Food prices;
- Credit control;
- Loan portfolio requirements and concessional rate of interest;
- Loan guarantee scheme;
- Rural banking; and
- National Economic Reconstruction Fund (NERFUND).

79. In general terms, the following impacts have been recorded in the Nigerian economy since 1985.

- i. Agricultural exports significantly increased between 1987 and 1999 while agricultural imports decreased slightly during the same period. For instance, whereas agricultural imports constituted about 17.3 percent of total import in the 1981-85 periods, they accounted for only about 9 percent in the 1986-91 period;
- ii. Deregulation of exchange rate, abolition of commodity boards and normalization of prices in the economy led to an impressive performance of the cash crop market so that farmers' earnings between 1986-1997 became greatly enhanced. For instance, the price of a tonne of cocoa increased by more than twenty-fold within the period;
- iii. The average annual growth rate of agricultural production increased generally from 3.5 percent before the deregulation to 6.4 percent between 1988 and 1998. In fact, except for fishery output that declined by about 40 percent, crops, livestock and forestry production recorded remarkable improvements within the period; and
- iv. Share of traditional export crops such as cocoa, palm kernel and rubber in the total volume of agricultural exports rose from 71.5 percent in pre-liberalization era to about 85 percent during period under review. Hitherto non-traditional export commodities including food staples also entered the export basket of the country and contributed over 8 percent to the total non-oil export earnings of the country. Generally better prices for agricultural commodities largely explained the positive growth in performance during the trade liberalization period.

F. Specific impacts of food price policies

80. As summarized earlier, the government of Nigeria adopted some policies during the decades of the 1970s and 1980s in an effort to boost production of food crops and in a way effectively stabilize food prices for a time. The policies in this category were:

- The World Bank-assisted Agricultural Development Programs (ADPs) introduced in 1975 with a focus on extension services and the wide use of fertilizers by farmers;
- The Operation Feed the Nation introduced in 1976 for the purpose of mobilizing the nation towards food self-sufficiency/self-reliance and encouraging balanced nutrition;
- The Green Revolution launched in April 1980 for making Nigeria self-sufficient in food within five years;
- The establishment of a Directorate of Food, Roads and Rural Infrastructure (DFRRI) in the Presidency in 1986 as a derivative of the Structural Adjustment Program (SAP) calculated to promote rural development and increase farmers' productivity; and
- The establishment in 1987 of the Agricultural Insurance Company to absorb risk in agricultural production.

Results showed, however, that in spite of these policies, the food sector remained one of concern for the government especially because of the persistence of high food prices. As if these problems were not enough, the Federal Government was at the time advised by the World Bank and IMF to remove subsidies on agricultural inputs, especially fertilizers, herbicides and insecticides. In response to this new policy, prices of inputs increased beyond the level that 70 percent of the farmers – the smallholder family size, subsistent farmers - could afford. The result was a decline in productivity in the food crop sub-sector especially from 1980. This low productivity led to a reduction in food supply that consequently led to an increase in food prices persisting until 1995. The trends in food prices observed between 1991 and 1995 and summarized in *Table 2* and *Figure 2* for maize, sorghum, rice, yam and cassava actually started in 1989/90 but were exacerbated

by the devaluation of the naira. Many observers argue that it was actually the structural adjustment program (SAP) that encouraged people back to the farms and brought about the modest fall in food prices observed in 1989 and 1990 as a result of increased food production.

Table 2: Average producer prices of staple food crops (in naira per tonne)

Year	Maize	Sorghum	Rice	Yam	Cassava
1980	200	210	570	561	301
1981	532	405	530	561	422
1982	572	233	575	593	399
1983	627	421	883	619	534
1984	687	761	1358	646	715
1985	755	1375	2082	674	957
1986	829	2011	3200	784	1281
1987	1563	2841	3817	2012	2023
1988	2736	2017	6322	2430	2686
1989	2061	1703	6300	2178	2479
1990	1261	1293	4425	2301	1262
1991	3318	3648	7544	4479	2860
1992	5514	4678	12606	5878	4001
1993	6606	6620	18184	10404	9920
1994	6315	6833	21999	9100	12321
1995	15738	16733	34603	21272	20605

Source: CBN (annual report and statement of accounts).

81. When a linear graph of price versus time was drawn for each crop (as summarized in Figure 2), there was a sharp rise in prices for selected food commodities between 1990 and 1995. This has been partially attributed to the devaluation of the Naira during the period. However, when these prices were deflated by the dollar exchange rate, the price change pattern was reversed. Prices for each crop fell with time, except for rice, cassava and yam. The behavioral pattern of cassava price is similar to that of rice but for different reasons. In the case of cassava, the price increase was due to increased direct and derived demand for the crop for human food and as industrial raw material especially in the textile industry. Rice, because it is mainly imported, responded mainly to changes in the exchange rate of the Naira. Yam, which is a substitute for cassava, responds to changes in demand caused by the increase in demand for cassava. There was an observed decline in the prices of maize and sorghum between 1983 and 1995. Rice, yam and cassava prices behaved differently and for different reasons. The prices of rice and yam declined between 1983 and 1984, but from 1985 rose steeply until 1989 when they leveled out. Cassava prices declined between 1983 and 1984 but from 1985, they have been rising gradually until now.

82. If these deflated prices are accepted as the true prices of foodstuffs, then it means that food prices, in response to the various government food policies, had started to fall by 1985/86. Maize that is probably the most important grain has responded best to the policies in that its real price fell between 1985 and 1989 and then stabilized after 1990. On the other hand, its nominal price as depicted in (Fig. 2) has, since 1990, increased remarkably and has not responded to policy shocks of any type.

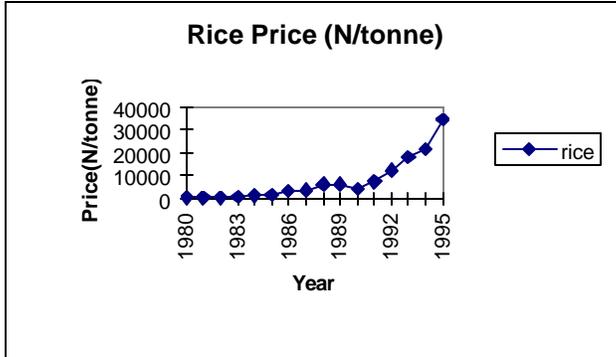
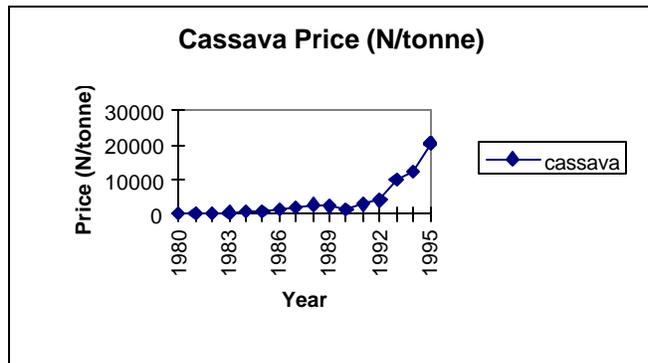
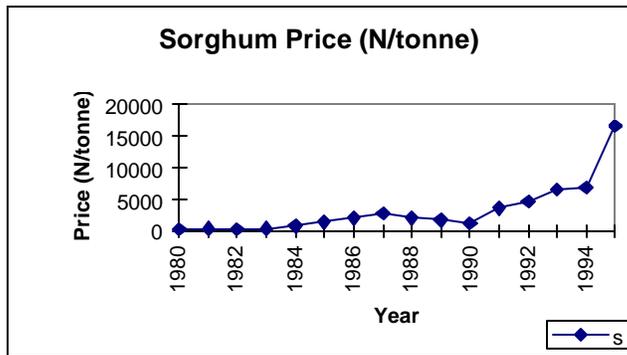
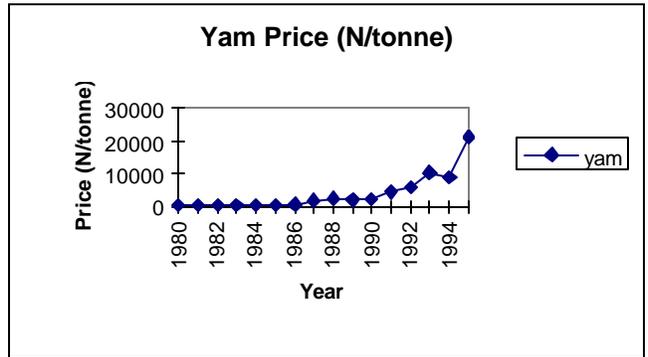
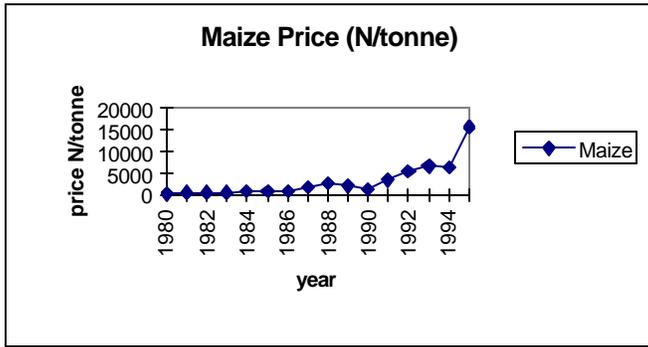


Figure 2: Graphical trends in average prices of staple crops, 1980-1995 in Naira per tonne

G. Impact of credit control policies

83. Credit control policy measures have been designed to increase the flow of credit to agricultural sector. The pressing need for these measures is borne out of the following assumptions with respect to credit access by the agricultural sector.

- i. Credit shortage is one of the major bottlenecks causing low resource productivity in traditional agriculture;
- ii. Scale expansion and the adoption of innovations in farming inevitably increases the credit need of farmers;
- iii. Little sowing capacity exists in rural areas where many of the farmers live;
- iv. The seasonal nature of farm production and income generation creates a need for short and medium term loans for financing production activities;
- v. Concessional lending arrangements are justified because:
 - a) Low interest rates relieve small farmers of exorbitant charges by private moneylenders;
 - b) Low interest rate is a mechanism for income transfer to farmers; and
 - c) Subsidized credit will induce farmers to use modern inputs.

H. Loan portfolio requirements and concessional rate of interest policy

84. Financial guidelines from CBN have prescribed that certain a percentage of the loan portfolio of Commercial and Merchant Banks be set aside for financing the agriculture sector. These guidelines have varied from 4 percent in 1972 to 12 percent in 1985 for Commercial Banks and 4 percent in 1977 to 15 percent in 1985 for Merchant Banks. According to Olomola (1991), many of these banks (except specialized banks like NACB) have not complied with this guideline despite the penalties stipulated for defaulters. The failure to comply was further compounded by another CBN guideline that requires the charging of an interest rate below the market rate of interest for loans extended to the preferred agriculture sector. Banks have always seen this guideline as uneconomic pricing of their credit portfolio. As an income transfer mechanism, the justification for low interest rate is that farmers are given a break on credit because they are poor and also as a means of partially offsetting national pricing or fiscal policy that adversely affects farm incomes. However, since the income subsidy is tied to credit access, few of the benefits from concessional interest rates filter down to the rural poor.

I. Loan guarantee scheme

85. The provisions under the Agricultural Credit Guarantee Scheme Fund (ACGSF) are an inducement to banks to extend more loans to agriculture since part of their loan recovery risk is transferred to the agency managing the fund. Actually, the liability of the agency managing ACGSF is limited to 75 percent of the value of the principal and interest outstanding. The existence of a loan guarantee scheme seems to have worsened repayment problems by encouraging the non-repayment mentality of borrowers. Many borrowers consider the guarantee under the ACGSF as government's way of fulfilling its objective of income transfer to farmers and so influential farmers who easily convince bankers to tolerate their loan defaults have always misused the provision. During the second republic (1979-1983), borrowers who surfaced through the support of important politicians often considered loans granted them as compensation for their loyalty and activities during electioneering. In many such cases the borrower always assumed that he does not have to repay his agricultural loan, more so that he is almost certain that legal pressures would not be brought against him. Loan recovery efforts slowed as lenders appeared to be more tolerant of loan defaults in view of the existence of the loan guarantee scheme. The apparent lack of full commitment to the objectives of the ACGSF by participating banks is not unconnected with the increasing rate of default and the reluctance often demonstrated by the Central Bank of Nigeria (CBN) in settling outstanding claims.

J. Rural bank branches

86. As a way of ensuring the success of the loans guarantee scheme, the CBN directed Commercial and Merchant banks in 1977 (almost simultaneously with the establishment of ACGSF) to open more branches in the rural areas of the country. They were mandated to operate within easy reach of prospective borrowers and help to promote the scheme in particular and economic development generally in the remote areas of the country. The first phase of the rural banking program (1977-1980) under which 200 bank branches were to be opened ended in June, 1980 with 12 branches short of the required number. At the end of the first phase, a total of N116.4 million was outstanding as deposits in all the rural branches opened under the program averaging N0.6 million per branch. Total loans and advances of these rural branches amounted to N22.4 million - about 19 percent of total deposits. Such was the extent and accumulation and re-investment going on at that time. The 94 percent implementation performance of rural bank branches achieved during the first phase declined to about 68 percent of the 266 new branches expected during the second phase (1980-1983).

87. This poor performance has been blamed on shortage of infrastructure in the affected rural areas in addition to the problem of inadequate financial and human resources. But more worrisome has been the tendency for banks to mobilize rural savings for use in urban areas and thus worsening the problem of inequities in the distribution of wealth. A survey by the CBN in 1982 revealed that virtually all the deposits collected by commercial and merchant banks from the rural areas were transferred to urban areas to finance urban activities. The CBN reacted by extending the instrument of portfolio requirement to rural bank lending. It directed that banks should lend not less than 30 percent of the total deposits collected by their rural branches to customers in such rural areas. This minimum-lending quota remained in force for three years before it was raised to 40 percent in 1985. Nevertheless, the question has remained unresolved as to whether or not the proper investment climate exists in the rural areas to enable banks capture the benefits of such portfolio requirement at a reasonable cost.

88. The foregoing consideration of the nature and effects of credit controls indicates that agricultural financing in Nigeria has been constrained to some extent by a number of bottlenecks that arise directly or indirectly from such controls. Sometimes, the problem emanates from the absence of complementary policy actions that are necessary to make credit controls effective. The main bottlenecks have been:

- i) Negative interest rates in real terms;
- ii) Persistently high rates of loan default;
- iii) Low level of rural savings mobilization;
- iv) Leakage of credit funds to unintended beneficiaries;
- v) Leakage of investment capital from rural to urban areas; and
- vi) Poor credit availability due to non-compliance of banks to portfolio requirements.

The list is not exhaustive but supports the fact that credit controls per se have little chance of succeeding unless they are based on realistic criteria which do not further exert distorting effects on the operations of the financial markets. Credit control policy cannot be a panacea to the inefficiencies in other input and output markets including those created by macro-policies and which have adverse consequences on borrowers' repayment capacity. Default cases have increased due in part to poor management of enterprises, outright abandonment of farms, loan diversion, depressed output prices, rising labor costs and an inefficient marketing system. These problems need more policy attention than the control of credit.

89. In other words, credit controls cannot create the missing physical inputs, markets, infrastructures and technologies that keep the productivity of farmers low. Neither can it relax the inflexibility in land tenure arrangements and the attendant highly inelastic supply of land that has imposed considerable limit on commercial farming. Some of the bottlenecks resulting from the rural banking program for example are complicated by the lack of physical, social and institutional infrastructure in the rural areas. This has made it difficult for the banks to attract the right caliber of staff to work in the rural branches. Where there is a shortage of adequately trained and qualified agricultural staff, there cannot be any effective monitoring and supervision of loans. To that extent, the problems of loan default and diversion prove insurmountable.

K. Performance and impact of NERFUND

90. Financial liberalization in the country limited the access of small- scale enterprises to formal credit. It is against this backdrop that National Economic Reconstruction Fund (NERFUND) was instituted to address the shortage of credit to small and medium enterprises (SMEs) which include agro-allied industries. One way of assessing the performance or impact of this agency has been to examine the total number and nature of projects approved by it for execution since its establishment in 1989. As at December 199, a total of 167 projects had received loan approvals estimated at N1.9 billion under the program. Of this number, 81 were for agro-allied industries, 63 for manufacturing, 9 for textiles, 4 for mining/quarrying, and 10 for industrial support services. Available data today, however, indicates that effective commitment (judging by the number of projects that actually received disbursement) is 103, made up of 54 agro-allied; 27 manufacturing; 10 textiles; 4 mining/quarrying; 8 and industrial support services establishments. Audited reports show that the total value of funds actually and effectively disbursed to date is about N648 million, about 34.1 percent of total approved.

91. Looked at from another impact perspective, this program has promoted financial deepening in the economy by encouraging banks to originate more and better quality loans to viable SMEs. The program was also intended to finance training and technical assistance to improve the skills of staff of the 98 participating banks in project appraisal, monitoring and supervision of SME loans, and to assist in problem identification and resolution. The expectation was that the training and additional experiences gained with SME lending would encourage banks to expand lending to SMEs over the longer term and to develop them as credit worthy banking customers. From this perspective, the project has been a failure. Participating banks have not embraced SMEs as a principal credit market.

92. The reason for this is not difficult to identify. The restrictive eligibility requirement of the fund has been a major source of complaints by participating banks. For instance, participating banks still frown at the requirement that they bear all the credit risks involved in financing the SMEs under NERFUND. Participating banks have therefore become cautious in dealing with SMEs. They have become very meticulous at appraising projects before approving them for the fear of endorsing non-viable projects. This has led to long delays in the process of evaluating, approving and disbursing the funds for the project. Finally, with the requirement that a minimum personal stake of one-third of the projected cost of a project be provided by the entrepreneur together with the provision of collateral securities, credit conditions have turned out to be even more stringent than requirements for loans from an ordinary commercial bank. As at today, NERFUND has been able to achieve the following statistics:

- Number of participating banks = 98;
- Number of banks with projects approved = 42;
- Number of projects approved = 167;
- Total estimated cost (approved projects) = 1.9 million; but
- Amount actually expended = N648 million.

These statistics show that, like many other government agency programs, NERFUND has not operated as a truly commercial entity that it is supposed to be. Consequently, the full impact that is expected from its operations has not been achieved. Funds available to it for disbursement appear to have been wasted on administrative and non-relevant overhead expenses.

L. Institutional strengths & weaknesses in Nigeria's agricultural technology system

93. As indicated earlier, Nigeria's agricultural technology system is a composite of 20 national agricultural research institutes and four international research centers together with improved seed distributors in the public and private sectors. The strengths and weaknesses of this system are clearly brought out when we examine the following:

- ❑ Organizational structure and governance of the system;
- ❑ Management of staff and other resources in the system;
- ❑ Institutional policies, regulations and customs in place;
- ❑ Current sources of funding the system;
- ❑ Public and private sector investment in the system; and
- ❑ Available improved agricultural technologies by target category and focus

Organizational structure and governance of Nigeria's agricultural technology system

94. The organizational structure of a typical national agricultural research center is such that a director is the chief executive officer. For those that are attached to universities, the Chairman of the Board of Governors (BOG) is the Vice Chancellor of the University concerned. Such Vice Chancellors are usually more or less "rubber-stamping" non-executive chairmen of the research centers' BOG that meets quarterly. Each Center's Director is, however, required to report to the BOG through his/her Chairman all matters that are beyond his/her competence on the Center's day-to-day policy implementation. Under the Director of each research center are a Deputy Director and two Assistant Directors, one in charge of Research and Planning, and the other in charge of Administration and Training. The Deputy Director is responsible to the Director, while the Assistant Directors are responsible to the Deputy Director. Also reporting to the Director are the Center's Secretary and the Finance Officer. Below the management level of Assistant Director is a cadre of management staff whose responsibilities range from zonal supervision to extension liaison and publicity/publications. Being civil servants, each of these staff is responsible to his immediate supervisor.

95. The organizational structure of the State ADPs is similarly structured. However, each State program is controlled at the apex by a body known as the Agricultural Development Project Executive Committee (ADPEC) under the chairmanship of the State Governor. Other members usually include:

- The State Commissioner of Agriculture (who normally is Vice Chairman);
- The State Commissioner of Works and Housing/Utilities;
- The State Commissioner of Finance;
- Secretary to the State Government;
- The Director of the Federal Department of Agriculture;
- The Regional Head of the Federal Agricultural Coordinating Unit nearby; and
- The Program Manager.

96. The administrative organ of each ADP is the Program Management Unit (PMU) that is under the chairmanship of the Program Manager. Other members of the PMU include the functional heads known as the Sub-Program Heads and the Zonal Managers of the agricultural zones within the affected State. Sub-programs are divided into components that are headed by key officers in the various disciplines concerned.

Management of staff and other resources in Nigeria's agro-technology system

97. Employees of national research centers in the country are all civil servants. Civil service regulations and orders therefore, bind them under a hierarchical structure. Final decision making authority is, however, concentrated on each center's director. All disciplinary matters follow a rigid established procedure that prevents the chief executive officer (the director) of each center from firing and hiring at will. Usually, staff are centrally employed by the federal civil service but deployed or relocated by the personnel department of the federal Ministry of Agriculture (FMA) to which each center belongs. Other resources are also centrally controlled. For instance, each center's budget is approved and tightly regulated by the FMA. There is only limited room for independent action by centers in cases of resource use. Such a regimented control of resource use and deployment at the center level greatly regulates dynamism and restricts productive performance. It reduces resource use efficiency and promotes indolence on the part of field staff.

M. Institutional policies, regulations and customs in place

98. The history surrounding Nigeria's technology generating centers shows that *public policies* associated with their establishment and development have been unstable and incoherent. In addition, there have been bureaucratic policy barriers that have separated the research and development components of these centers thereby rendering them impotent in technology generation. This problem has emanated from putting the two components under the control and management of two separate government ministries, namely: the Ministry of Science and Technology for the technology component, and the Ministry of Agriculture for the development component. The result of this policy lapse has been a lack of cooperation and little coordination between the activities and officials of these two ministries. Furthermore, *internal policies* in these institutions are such that self-development is not encouraged. Because staff promotion is based on the number of years spent on a given position and one's connection with the ministry's management hierarchy rather than on proven productivity, employees normally count out their years and wait to be moved from one level to another. This is a most unproductive way of running a research system. The result has been the institutionalization of a system that is insensitive and unresponsive to the needs of the agriculture sector.

99. *External (public) regulations* governing the operations of these national institutes have been such that almost all of them have been left in limbo. Inadequate financing and restrictions with regard to staff employment, deployment and discipline have, for instance, together emasculated the performance of these institutions. Operational regulations governing these institutions fail to give explicit considerations to the issue of sustainable agricultural technology development. The predominant undesirable culture of the government not encouraging scientists and staff of these institutions to attend and participate in conferences/workshops so as to actively rub minds with their counterparts in other parts of the world has systematically eroded their capacity as researchers. Furthermore, poor financing and the continuous threat to privatize these institutions have left the scientists and other support staff insecure and, therefore, not fully committed to the goals and objectives of the system. Consequently, the institutions are operated as efficiently as they should, and individuals are not motivated to perform effectively and conscientiously. Ultimately, the agriculture sector is not being supported and guided by this technology system to be productive, efficient and competitive as it should be.

N. Current sources of funding the technology system

100. Currently, the Federal government of Nigeria funds all national agricultural research centers, while the State and Federal governments jointly fund the agricultural development programs (ADPs) at 55 percent and 45 percent respectively. Up till 1995, the World Bank was also a contributor to the funding of the ADPs. The organized private contributes absolutely nothing to agricultural research and technology development in the country. In fact, Nigeria's total expenditure on her existing agricultural research centers has not only been unstable, but also consistently falling over the years.

101. Recent analysis of the level of funding of agricultural research and technology dissemination in the country, however, shows that Nigeria is lagging behind many African countries (Ikpi, 1998). For instance, official records show that Nigeria is among the six countries that have invested least in agricultural research. A comparative analysis of research funding in sub-Sahara Africa confirms that between 1980 and 1997, only eleven countries out of the forty-seven in sub-Sahara Africa spent on the average up to or a little over 8 percent of their agriculture GDP on agricultural research. These are Mali (17.37 percent), Uganda (9.93 percent), Sierra Leone (9.78 percent), Tanzania (also 8.51 percent), Ghana (8.46 percent), Malawi (8.36 percent), and Swaziland (8.16 percent). On the other hand, six countries, namely: Benin (with only 0.36 percent), Sudan (0.97 percent), Central African Republic (1.09 percent), Nigeria (1.45 percent), Guinea-Bissau (1.59 percent), and Chad (1.88 percent) have less than 2 percent eleven-year averages of their agriculture GDP invested in agricultural research. For a country like Nigeria that is blessed with so much agricultural resource and financial endowments to invest so little in her agricultural research system suggests culpable neglect or down right policy myopia on the part of policy makers in the country (Ikpi, 1998).

O. Public and private sector investment in the technology system

102. While national agricultural research centers are solely funded by Nigeria's public sector, investment in the international research centers in the country is from financial resources provided primarily by the private sector. A conservative estimate shows that the Consultative Group on International Agricultural Research (CGIAR) has, so far, invested more than \$50 billion into agricultural technology development and dissemination research throughout the world. IITA, ILRI, WARDA, and ICRISAT (which all have research centers/stations in Nigeria) are part of the consultative group (CG) system. Other than these foreign country private investors, there is little or no indication that the organized private sector of Nigeria is interested in funding agricultural research. Efforts by the federal government to make private sector companies invest in agricultural research and education through annual taxation have not yet yielded any results.

103. The reasons usually presented for this low level of investment by the organized private sector in Nigeria is that the effort does not pay positive dividends. They look at this from the profit-generating capacity of such investments. But interestingly, IFPRI (1998) analysis shows that for every dollar invested in agricultural technology development research in any country, there is a return of more than a dollar to that country's economy. In other words, it is a win-win situation in which everyone benefits through increased actual food production and improved resource productivity in the economy. The donors, investors, research scientists, and the intended beneficiaries reap positive rewards from such an investment.

P. Available improved agricultural technologies by target category and focus

104. As indicated earlier, there is a sizable pack of improved technologies that have been developed by international and national research centers targeted at the state agricultural development programs (ADPs), improved seed disseminators in the organized private sector, and community seed growers. These include the following:

For ADPs:

Cassava: TMS30572, TMS30555, TMS4(2)1425, TMS50395, NR40144

Maize: AM9801, AM9805, AM9806, AM9807, AM9808, AM9811.

Rice – ITA 150, FARO 33, FARO 35, FARO 44, and the Ofada cultivar complex.

Soybeans: TGx1878-12E, TGx1835-10E, TGx1830-20E, TGx1805-8F, TGx1789-7F.

Cowpea: IT95K-1091-3, IT95K1096-7, IT95K-1020-12, IT95K1093-5.

For private sector disseminators of improved seed:

Cassava: TMS30572, TMS30555, TMS50395, TMS4(2)1425, NR40144.

Rice: ITA 150, IR 1416, FARO 33 & 44, and BG90-2.

Soybean: TGx1878-12E, TGx1830-20E, TGx1835-10E, TGx1485-1D.

Cowpea: IT95K-1091-3, IT95K1096-7, IT95K1020-12, IT95K1093-5.

Q. Agricultural technology and nutritional considerations

105. Over the years, UNICEF and Nigerian nutritionists have raised concerns about malnutrition in over 30 percent of Nigeria's population. Such concerns have highlighted serious vitamin A and micronutrients deficiency problems in certain categories of rural smallholder farmers, urban low-income earners, female-headed households and children. Nutrition estimates show that especially due to the generally poor macroeconomic performance and slow development in the past ten years, most Nigerian rural households have experienced a real decline in their income levels. Consequently, the inability of members of these households to fulfil their nutritional and non-food requirements to an equivalent value of \$40 per annum has been widespread and growing. Children and women in such rural households live below the poverty line and have inadequate intakes of food and fiber. They have severe deficiencies of vitamin A and some essential micronutrients (especially iron and iodine).

106. Departments of Food Technology at the University of Ibadan and Obafemi Awolowo University, Ile-Ife have, in conjunction with UNICEF and some national research centers and ADPs, developed some nutrition-related technologies that can be used to improve or fortify foods of both children and adults. The particular food-related technologies they have worked with and adopted include:

(a) *In the short run*, the fortification of cassava flour with soybean products; and

(b) *In the long term*:

- The supplementation of manufactured vitamin A doses for children with the consumption of Nigerian traditional and indigenous crops like cowpeas, groundnuts and sweet potatoes, and leafy vegetables like *amaranthus*, cat whiskers and Jews mallow that are all rich in vitamin A, micro-nutrients (especially iron and iodine) and fat; and
- The adoption of continuous and sustainable technology-supported practices (like breast feeding and salt iodization) that will ensure the elimination of the identified nutrition problems.

107. The long-term approach will involve adopting a collaborative arrangement with the private sector (especially the oil companies) so that selected traditionally cultivated crops (namely: indigenous leafy vegetables, groundnuts, cowpeas and sweet potatoes) are multiplied and distributed among the target groups who are then encouraged to consume

them. The entire project is premised on the fact that there are some indigenous crops in Nigeria that are by far richer in vitamin A, micro-nutrients and fat content than their exotic alternatives, and yet have, over the years been inadvertently ignored or neglected and avoided by Nigerians. The objective of the project is for oil companies in the country to fund the initial selection, production and immediate distribution of the improved germplasms of these crops and vegetables to ADPs and other willing private-sector collaborators. Such collaborators (including NGOs) can then multiply and distribute them to farmers in affected areas.

R. Technical issues in the agricultural technology system of Nigeria

108. A discussion of the technical issues involved in the agricultural technology development system of the country needs to touch on the current efficiency level of the system and strategies for enhancing the system's effectiveness in transferring technology to private-sector end-users. Generally, factors that contribute to a successful agricultural technology development and transfer industry in any country include the following key ones:

- Production system organization and efficiency within the technology system;
- Factor input and output productivity in the system;
- Marketing system organization and efficiency;
- Policy climate/environment surrounding the system; and
- Technology development strategy effectiveness that keeps pace with global trends.

These factors usually contribute individually and collectively towards ensuring that agricultural technology development and international trade in the final agricultural produce of the country are successful and profitable.

109. *With respect to agricultural technology production system organization and efficiency and input resource productivity, a production system intended for successful commercialization needs to be properly organized and efficiently operated. As a success factor, therefore, such a system requires five important considerations, namely:*

- Availability of raw materials (such as scientists and well-equipped laboratories);
- Organization of relevant production of crops demanded by the beneficiaries;
- Degree of technology diffusion;
- Technology dissemination methods used; and
- Level of complexity of delivery of the improved technology package to be adopted.

110. Improved crop technology development in Nigeria is ordinarily a big business involving 24 research centers that are very advanced in their generation of agricultural technologies. Although farmers in Nigeria are generally small-scale and have simple equipment consisting mainly of cutlasses and hoes, improved crop technology is available ("on the shelf") for application and adoption to increase agricultural output in the country. For example, proven high-yielding cassava varieties developed by the International Institute of Tropical Agriculture (IITA) and other research centers in Nigeria do not yet appear to have been fully accepted and adopted into the national farming system of Nigeria. In addition, many post-harvest technologies that have been designed and have their prototypes ready are still to be produced in commercial quantities by RAID and departments of food technology and engineering in the University of Ibadan and Obafemi Awolowo University. Field study visits in June 1998 showed that IITA cassava cultivars are being slowly introduced and accepted into the national agricultural research and farming systems of the country.

111. In general terms, the productivity of a given enterprise or industry is usually defined by its resource-deployment capacity and the general level of output derived from the use of those resources. In other words, the productivity level of the agricultural technology system in Nigeria can be illustrated by comparing the rate at which required productive resources are converted by the technology system into useful outputs demanded by the farmers in Nigeria. Furthermore, either a *concentration index* or the *scale of organization* of the centers concerned may also define the technology industry's productivity. Such concentration index is measured by the total quantity of some selected crop and post harvest processing technologies in the system that are contributed by a specified number of the research centers producing the technologies. Finally, productivity is sometimes measured in relation to either the factor(s) of production or the final output. In either case, *productivity is a good indicator of efficiency in resource use.*

112. When considered on the factors-of-production basis, productivity estimates for labor, land and capital invested in agricultural technology development in Nigeria show high and increasing returns. This is borne out by the fact that the use of any of the improved crop technologies developed in the country's research centers currently generally leads to increased yield and total agricultural output. This is an indication that marginal factor productivity for the agricultural technology industry in the country is not yet optimal, and that factors of production employed in the technology industry of the country are not yet being sufficiently and effectively utilized in the industry.

113. At the overall technology industry level, however, available production data show that output productivity estimates are low. For example, with respect to the entire technology system performance in 1999, production effect estimates in the country show that the resource-deployment capacity in the agricultural technology industry is poor, covering less than 35 percent of the level that is needed for desirable agricultural output impacting. In other words, although improved crop technologies are abundant in the country, their use rate is below desirable and economic levels. This is partially attributable to the fact that, given the current low farm productivity, it will take approximately more than 95 percent of the farmers in the country to adopt these improved technologies for agricultural output to increase. At this rate, it is equivalent to requiring millions of farmers in the country operating at their current output level to provide less than 50 percent of the required food output as compared to a few farmers (usually 5 to 15 percent) in say, the US. Such a concentration index is too high, indicating either a low-food productive base or a low-capacity utilization of improved crop technologies by Nigerian farmers.

114. The generally low average food production in the country is an indication that much still needs to be done in terms of disseminating improved agricultural technologies for adoption. In fact, field visits throughout the country confirm that the National Agricultural Research scientists collaborating with IITA still have some serious sensitization work to do in order to effectively disseminate improved crop technologies currently wasting on the "shelves" of research centers. The total land area devoted to improved crop technologies in the country is estimated to be less than 10 percent, indicating that it has not yet reached the points of physical and economic optima that should yield attractive profits to farmers, processors and exporters. But the potential for increased food output is very much there.

115. *With respect to marketing system organization and efficiency*, the agricultural technology system of Nigeria still has a long way to go. This is because current marketing arrangements at both the public- and private sector levels are haphazard and uncoordinated. Thus, farmers are easily exploited price-wise while demanded inputs are not supplied on time and in the economic quantity needed. A marketing arrangement in which the users of a desired commodity are being wholly controlled or restricted as to what they get and when they get it by the suppliers is highly irregular and economically unacceptable. It amounts to the creation of artificial scarcity for inputs that are available but not accessible either due to high prices or deliberate extortion on the part of sellers because they know farmers must come for them. Unfortunately, due to illiteracy or ignorance or both, existing farmer groups and cooperatives do not exercise their power of consumerism to force improved seed dealers to come to their terms. And pervasive inaction on the part of state ADPs does not help farmers circumvent the stranglehold that the few improved seed dealers in the organized private sector have on agriculture.

116. *In the matter of policy environment*, the near absence of strict and enforceable governmental policy controls and guidelines for the agricultural technology development system continues to affect the operational efficiency of the technology industry negatively. The policy climate surrounding agricultural technology development appears currently ineffective, uncertain and non-directional. There are no enforceable legal backdrops that operators or investors in the industry can depend on for protecting their investment rights. Continued delays in enacting laws that encourage, govern and protect directed investment in the technology development sector of agriculture further harm the level of efficiency in the industry. This is one area that USAID/N might wish to assist the government of Nigeria in, namely: to organize the development and drafting of a standing, enforceable and sustained *policy for agriculture and technology development* in the country.

117. *Finally, with respect to the effectiveness of technology development strategy in Nigeria*, it is important to emphasize here that this depends primarily on technology developers themselves and partly on the extension delivery system in the country. Good technologies that have been developed but are not extended to farmers are useless and a wasted investment. Repeated and unsuccessful attempts at establishing a workable extension system in the country that will operate without hiccups show that more is needed than just using the half-hearted and problem-prone training-and-visit extension strategy currently being used in this country. A more pragmatic and result-oriented strategy is called for that will place selected experts to work closely (on one-on-one basis) with farmers in the field on specific problems and for a limited period of time. Such volunteer experts will have to be sufficiently knowledgeable in not only the technology that is being extended, but also in the implementation procedure to be applied for achieving the set objectives within a limited time frame.

IV. MICRO-ENTERPRISE DEVELOPMENT IN NIGERIA'S AGRICULTURE SECTOR

118. Micro-enterprises are generally small-to-medium-scale economic units, organizations, projects, enterprises, undertakings or ventures whose activities are systematic and purposeful, with many usually distinctly specialized in scope but effectively isolated in technological span and capacity. Low-level technologies, low access to credit, low-to-medium level managerial capacity, and low-level linkage with modern technology generally characterize them. Some are simple to operate while others are especially difficult, complicated and risky businesses. Most micro-enterprises in Nigeria are proprietorships with a single owner-operator; but many are family businesses enjoying the services of two to five workers who may or may not be employees in the strict sense of the term. In more than 90 percent of the cases, micro-enterprises in the country are usually not officially registered with the Corporate Affairs Commission (CAC), the government agency that is responsible for handling such matters in the country. Micro-enterprises are so called because, in relative terms, they usually require very little initial investment and much less operating capital than do their larger corporate counterparts. Consequently, their output capacity is small and often limited. In spite of that, however, micro-enterprises are estimated to contribute, on the average, between 40 and 70 percent to the gross domestic product of Nigeria.

119. Micro-enterprises in Nigeria fall into four major classes within which there are more than 35 identifiable categories or typologies. These classes and types include:

- i. *Production micro-enterprises*
- ii. *Manufacturing micro-enterprises*
- iii. *Trading micro-enterprises*
- iv. *Service-providing micro-enterprises*

Production micro-enterprises (especially in the farming and fishing categories) are more commonly found in rural areas but are not exclusive to them; a few are also found in peri-urban and urban centers throughout the country. Furniture enterprises are typically more in urban than in rural areas; while firewood and toothpick producers are more commonly found in rural areas. The non-agriculture-based and trading micro-enterprises are about equally distributed between the three location settings but with a higher volume of work being done by the urban and peri-urban ones. Manufacturing and service-providing micro-enterprises are more attracted to urban and sub-urban areas in Nigeria because of the frequency of demand for them.

A. Contributions of micro-enterprises to Nigeria's agriculture and the economy

120. Through an interaction of many natural and artificially-created powerful forces, micro-enterprises are known all over the world to have emerged as important agents of economic and social transformation that deeply affect the lives of all people. The specific contributions that micro-enterprises make to Nigeria's agriculture and society at large often seem individually small but are actually collectively monumental and very significant. Some of such contributions are, for instance, purely *economic*; others are *social/political*; and yet others are *cultural*. Many of them are physically measurable and quantifiable, while others are merely qualitative and non-quantifiable.

121. The economic contributions relate to growth of the gross domestic product, employment generation, domestic savings accumulation/capital formation, and structural definition and composition of the economy. The social/political contributions of these small businesses include the satisfaction, peace, security and happiness they bring to the owner-operators and the larger society that they serve, and the general desirable transformation they impose on society. Culturally, micro-enterprises (especially those in

the services and non-agriculture-based categories) promote the image and artistic stature of the country.

(a) Contribution to growth

122. Micro-enterprises are a fundamental source of dynamism and growth in the process of economic development in Nigeria. Micro-enterprises achieve this through:

- Adjusting better and more readily to external shocks that hit the Nigerian economy than the large enterprises do;
- Serving as rich seedbeds for the growth of Nigerians' entrepreneurial capacity;
- Employing, relative to their size, more labor-intensive methods of production, thus creating jobs at lower capital cost while contributing to poverty alleviation; and
- Promoting industrial dispersal and efficient utilization of local inputs by fostering strong industrial linkages and diffusion of appropriate technology especially where they produce for export or supply inputs to large enterprises.

It is generally accepted by students of business and industry that micro-enterprises bestow on the Nigerian economy an unbelievable property of resilience even in the face of prolonged economic mismanagement and misfortune on the country. The Nigerian experience during the years of oppressive military rule is a case in point in which after many years of economic woes and international isolation, the economy was still able to survive. In fact, it got to a point in 1989 when the then President and Head of State, General Babangida, had to openly wonder what it was that made the Nigerian economy defy traditional economic theory. He noted that despite prolonged and worsening social upheavals and economic depression in the country, the economy had not collapsed as dictated by common reasoning and traditional economic thinking. The reason for the observed resilience of the Nigerian economy is, of course, the large contribution of the country's informal sector that is dominated by micro-enterprises.

123. In Nigeria, micro-enterprises constitute more than 95 percent of the total number of enterprises in each sector of the national economy, but currently account for less than 20 percent of the value of non-oil exports because they produce mainly for domestic industries and consumption. However, despite the dominance of large conglomerates in the private sectors of the country, micro-enterprises still accounted, on the average, for more than 55 percent of the production/manufacturing employment and over 25 percent of the manufacturing value added in Nigeria in 1990 (UNIDO, 1995). Encouragingly, available evidence shows small businesses in the country to be increasing in numbers faster than their large-scale counterparts. In fact, with the growing glut of university and polytechnic graduates in Nigeria's labor market coupled with increasing rationalization measures being taken by the public sector and large corporate firms, more and more enterprising young men and women are now forced to establish their own micro-enterprises. They have come to realize the need for turning challenges into business opportunities, and are encouragingly expanding the borders of small-scale enterprise activities thereby indicating continuing growth in the small-business sector.

(b) Contribution to employment generation

124. Micro-enterprises have the greatest potential for creating employment. In most instances, micro-enterprises constitute the only opportunity of employment for Nigerian

women to earn a subsistence income, as paid employment is usually generally out of their reach because of illiteracy, lack of skill, family responsibilities, etc.

125. Micro-enterprises in Nigeria (but especially in agriculture) are typically supply-driven and, so, provide standard training, technical assistance and credit or investment funds that are necessary ingredients for the sector's sustained development. Most small enterprise growth has, however, been greatly affected by demand-driven customized support provided by large customers (like foreign donor agencies, big firms, government agencies, state enterprises, and traders) and designed to stimulate sustained growth. For instance, in some states of the federation where clusters of firms have successfully entered international markets for footwear, textiles, alcoholic beverages, etc., production has been encouraged predominantly by small-scale retailers and companies whose role is more with marketing, retailing and organizing the production chain than with production itself. Such clusters of firms form what are called *buyer-driven commodity chains* whose capacity to generate employment opportunities becomes almost self-sustaining.

126. It is generally believed that under a properly structured Nigerian economy, micro-enterprises could create employment opportunities twice as fast as conglomerates. This makes them more widely regarded as a panacea for unemployment and economic recession for a country like Nigeria. As alternatives to public enterprises, they promote the practice of privatization that greatly reduces inflationary tendencies in the economy.

(c) Contribution to domestic savings accumulation and capital formation

127. The desire to establish micro-enterprises within a given economy generally increases the people's propensity to save or to source funds domestically from either family members or friends. Once applied, such funds encourage the users to perform profitably so that they can pay back their loans or generate more money for plowing back into the business. Recent estimates by the World Bank (1994) and UNIDO (1995) indicate that micro-enterprises in Nigeria generate, on the average, between 40 and 70 percent of the gross domestic products, and 50 percent of the total domestic savings of the country. Furthermore, they contribute, on the average, over 45 percent of the growth in capital accumulation of the country. This percentage contribution is confirmed by 1995 estimates of the Central Bank of Nigeria, which indicate that small business enterprises in the country accounted for more than 50 percent of all capital accumulated in Nigeria in 1994.

(d) Contribution to structural definition of the economy

128. Like most economies of developing countries, that of Nigeria is structurally defined and supported by the number and type of small businesses that operate in the country. Some of these micro-enterprises in the economy are in the informal sector, while the others are in the formal sector. The proportion of small enterprises in the informal sector of Nigeria's economy to those in the formal sector determines the capacity of the economy to withstand economic and social disturbances. It is the magnitude of this capacity to withstand shocks and disturbances that is referred to as "resilience". Where the ratio is greater than one, the economy is resilient; and where it is less than one, it is susceptible to collapse occasioned by economic and social pressure. In other words, where there are more micro-enterprises in the informal sector than there are in the formal sector, the degree of resilience goes up. It is important to note here that the Nigerian economy depends largely on the informal sector to survive. For as long as micro-enterprises of the country are not forced by circumstances to become part of the underground economy, they continue to contribute to the stability and structural growth of the country.

B. Institutional and operational constraints to micro-enterprise development

129. The development of micro-enterprises in Nigeria is largely determined by the availability of micro-credit to the SME operators. Micro-credit as a component of general agricultural finance is plagued by a number of problems. These are both institutional and operational constraints that relate to imperfections such as:

- Market fragmentation;
- Scarcity of collateral by micro-enterprise owners;
- Poor information availability and dissemination;
- Underdeveloped property rights of micro-enterprise operators;
- Poor and often rudimentary infrastructure;
- Poor to non-existent SME law-enforcement system;
- Low-level literacy of the entrepreneurs; and the consequent
- Covariate risk.

These imperfections have often resulted in limited access to credit, credit rationing, high interest rates, and a consequently high rate of default. Unfortunately, the level of the effects of these imperfections varies remarkably with respect to the gender of the micro-enterprise operators.

130. In an effort to minimize these constraints, government has tried to put in place mechanisms like micro-credit facilities directed at SMEs and women, and entrepreneurial education through adult literacy classes that can improve micro-enterprise operations. However, because of the many barriers that confront women, the main operators of micro enterprises, such interventions have had only salutary impacts. New attempts to assist SMEs to overcome these institutional and operational constraints must have to target those areas that have to deal with rural infrastructure, SME-law enforcement system, and increased micro-credit.

131. Generally, women are the hardest hit group among small-business entrepreneurs. They are particularly often confronted with a number of constraints in their access to self-employment when they decide to establish micro-enterprises. These gender-specific constraints are very evident in the formation and operation of agriculture-related micro-enterprises in Nigeria. They include the following:

- *Behavioral barriers* such as women having little self-confidence and a negative self-image;
- *Educational barriers* because women have relatively lower education levels, have received a biased education, and usually have limited access to vocational training opportunities;
- *Infrastructural barriers* which deny them access to credit, technology adoption, support services, land, information;
- *Legal barriers* which make independent legal action limited for women;
- *Occupational barriers* which cause women to have fewer opportunities in the formal sector for skill development;
- *Role barriers* because of conflicting role demands and time constraints; and
- *Social and cultural barriers* that promote negative attitudes towards women in business demand that women must fulfill other roles, restrict them as to the choice of sector, and increase their lack of family support and mobility.

132. Most of these constraints have socio-cultural origin, and so require deep-rooted attitudinal changes in the socio-cultural environment. Despite these observed constraints,

many women still become self-employed by setting up micro-enterprises. Successful enterprises set up by such women display the following features:

- ✓ They are set up with little capital and existing skills which evolve around the domestic sphere;
- ✓ The units are normally unregistered and operate in the informal sector of the economy;
- ✓ In many cases, production under such enterprises takes place at home, generally in the same premises as for other home activities. In some cases, women sit at the market place while producing (e.g. basket weaving), selling as well as cooking and looking after children;
- ✓ They heavily depend upon family workers who may or may not be paid;
- ✓ They tend to concentrate in the least-rewarding sectors. Production usually covers a narrow range of consumer goods (garments, woven goods, processed food, drinks, etc.) and handicrafts;
- ✓ These economic activities are most often undertaken in addition to household chores and, in rural areas, to agriculture, so that women are not able to dedicate continuous attention to it. There is a lack of clear-cut division between households and business in terms of time allocation and financial flows with the result that re-investment is often subject to prior fulfillment of the family's basic needs. The total work load thus becomes heavy;
- ✓ The marketing and managerial functions are embryonic and not differentiated. The owner/operator performs all the functions herself;
- ✓ Output is marketed locally (in the case of local consumer goods) or is usually intended for the tourist and export markets (in the case of handicrafts);
- ✓ Depending on the socio-cultural environment and transport facilities, women may market their production directly or through intermediaries such as male members of the household or traders (including money lenders); and
- ✓ Depending on the socio-cultural and legal environment, women may or may not fully control revenues from their economic activities. In many situations, the male members of the household have control over these revenues. This loss of control usually happens when the women do not or cannot market their own output. However, women in trading activities are more likely to control the revenues from their business.

Thus, for a proper development of the micro-enterprise sector, women-headed enterprises should not be viewed in isolation from the economic and socio-cultural context in which they evolve. The establishment, survival and growth of women-headed enterprises are all crucially affected by societal values such as under-valuation of women's economic role, sex-role stereotyping, women's limited access to certain types of vocational training, industrial policies and legislation.

C. Policy, institutional and technical issues impacting on micro-enterprise development

133. Nigeria's micro-enterprise development in the past has been greatly influenced by deliberate government action in policy, institutional and technical areas. These issues are discussed here under four sub-heads:

- Policy incentives and disincentives;
- Institutional and market opportunities;
- Availability and quality of appropriate technologies; and
- Type, scope and efficiency of other support services.

D. Policy incentives and disincentives for micro-enterprise development

134. The economic development activities carried out in Nigeria that affect agricultural micro-enterprise since independence can be grouped into two major periods: (a) the 1960-1985 period, and (b) the 1986-1993 period. The first period coincides with an era of pervasive administrative controls while the second is characterized by more liberal policies involving greater reliance on market forces to coordinate economic activities.

(a) The 1960-1985 period policy overview

135. At the attainment of independence in 1960, the following problems prevailing in the country dictated the direction of economic policy: high rate of illiteracy, low per capita income, limited purchasing power, inadequate infrastructure and very few modern industries. There was also the challenge to provide gainful employment. The foreign exchange base of the country was very narrow comprising mainly agricultural commodities that were vulnerable to the economic cycles of the industrialized world. During this period (1960-1985) four national development plans were drawn. The first national development plan covered the period 1962-1968, but its implementation was interrupted by the civil war from 1967 to 1969. The second (1970-1974), the third (1975-1980) and the fourth (1981-1985) followed thereafter.

Fiscal Policy

136. The two main instruments for executing this policy were government expenditure and taxation. The overriding objectives of the fiscal policy pursued during the 1960-1985 period were to generate government revenue to finance social and economic development. Initially, fiscal policy focused on generating revenue through such instruments as agricultural export taxes, excise and import duties. After the civil war, when the problem of high inflation and serious supply shortages arose, a host of wage and price control measures were introduced. By the end of the second plan period in 1974, Nigeria became very buoyant due to financial resources generated from the four-fold increase in oil prices. When the third plan took-off in 1975, therefore, the role of fiscal policy was changed to that of reducing domestic inflation by making imports easier (through the relaxation of administrative controls), and cheaper (through the reduction of customs and excise duties).

137. In 1978, however, the country's foreign exchange earnings dropped drastically due to a glut in the international oil market that led to a fall in the price of crude oil. As a result, import liberalization policies were reversed so that import duties were raised and virtually all goods were subject to a stringent import licensing system in a bid to shore up sagging government revenues and foreign exchange reserves. When imports were liberalized coupled with an overvalued naira at that period, home-produced goods by micro-enterprises could not compete favorably with their imported counterparts in price and quality. This led to a stagnation of the activities of these domestic micro-enterprises. The same thing happened when export taxes were imposed on agricultural products that were exported at the primary level.

Monetary policy

138. Nigeria's monetary policy, besides reinforcing the objectives of the fiscal policy, was geared towards increasing the output of the agriculture and industry sectors, as well as controlling inflation. To achieve these goals, a credit allocation system favoring key economic sectors, including agriculture was introduced. Bank interest rates were raised and money supply was controlled. In the face of a continuing shortfall in revenue,

however, the rate of inflation increased to 34 percent in 1975. In order to control rising inflation, government relaxed general import restrictions again, which included food and general agricultural products. This in turn had a strong long-term adverse impact on domestic agricultural production that at the time was manned mostly by small-scale farmers operating at the micro-level.

Income policy

139. During most of the 1970-1985 period, Nigeria's income policy was designed to achieve two main objectives: price stability and equitable distribution of income. With respect to rural areas where agricultural micro-enterprises predominate, government continued with its producer price support program that was to guarantee increased incomes to farmers and reduce rural-urban income disparities. Producer prices were increased by between 15 and 90 percent. In addition, substantial subsidies were introduced for fertilizers, other agrochemical inputs, mechanization and some support services.

Exchange rate policy

140. Starting from the oil boom era of the 1970s, the Nigerian government pursued a fixed exchange rate policy in spite of the huge divergence between domestic inflation and the international price level. The extent of over-valuation of the naira was estimated at 100 percent between 1970-75, 200 percent between 1976-79, and about 900 percent during the 1980-85 periods. This reduced the competitiveness of locally produced goods in relation to substitutes. Consequently, agricultural production, exports and income suffered as a result of the overvalued exchange rate that favored cheap imports at the expense of domestic agricultural products.

(b) The 1986-1998 period policy overview

141. The prevailing economic conditions during this period included increasing inflation, mounting balance of payments problem, depressed international crude oil market, and declining petroleum export earnings. Agricultural production stagnated and there was general depression in the economy. A structural adjustment program (SAP) had to be introduced in July 1986 in an attempt to checkmate these creeping economic problems. In addition, starting from 1990, government embarked on the national rolling plan system as an instrument for managing national economic development policies and programs since this allowed for a more flexible management of the economy under uncertainty.

Fiscal policies

142. The thrust of fiscal policies under SAP was to reduce government expenditure and eliminate fiscal deficit emphasis was therefore placed on the rationalization of government programs and the reduction or total elimination of government subsidies on selected products, including petroleum products and agricultural inputs. Also the share of the agricultural sector in federal government capital expenditure declined from 2.46 percent in 1986 to 2.5 percent in 1992 when SAP was officially discontinued as a deliberate government policy. Between 1993 and 1998 the Abacha regime introduced fiscal policies that greatly increased fiscal deficits in the country. With the onset of the democratic governance of the Obasanjo administration, however, application of annual fiscal policies that partially contains elements of structural adjustment has gradually brought back sanity into the countries fiscal policies. The results have been dramatic improvements not only in the fiscal deficits but also a remarkable reduction in the inflation rate from a double-digit (19 percent) to a single-digit figure (6 percent).

Monetary policies

143. Interest rate was liberalized in a bid to allow market forces to influence the inflow of savings and allocation of credit. With respect to credit allocation, the economy was classified into only two sectors, instead of 18 as before, namely, priority sectors and other sectors. The priority sectors included agriculture, manufacturing and construction, which were to receive a minimum of 50 percent of the credit to private sector, and all other sectors were to receive a maximum of 50 percent. As a result of the liberal interest rates policy, there were large increases in interest rate in Nigeria. The nominal prime lending rate increased from 9.6 percent in 1986 to 36.1 percent in 1998. The agriculture sector including its micro-enterprise had to compete for credit at high market-determined interest rates that were beyond the reach of small farmers.

Exchange rate and trade policies

144. The broad aims of the trade and exchange rate policies of this era were reduced dependence on the oil sector for foreign exchange earnings through the expansion of agricultural exports, and to encourage the more efficient production of manufactured goods based on local resources. Import licensing and all export duties was abolished. The tariff structure was designed to expose local producers in all sectors (including agriculture) to international competition while offering them protection against dumping and unfair competition. This period also recorded the introduction of export incentives that encourage local producers especially agriculture to explore international market. A tabulation of these incentives that began 1986 is shown in *Table 3*.

Credit Policy

145. The policy intervention in agricultural (micro-enterprise) financing derives from five major assumptions:

1. Credit shortage is one of the major bottlenecks causing low land and labor productivity in traditional agriculture
2. Scale expansion and the adoption of innovations in farming inevitably increases the credit need of farmers
3. Little savings capacity exists in rural areas where majority of the farmers live
4. The seasonal nature of farm production and income generation creates a need for short and medium term loans for financing production activities
5. Concessional lending arrangements are justified because:
 - (i) Low interest rate will relieve the small farmers of the exorbitant charges of private money lenders
 - (ii) Low interest rate is a mechanism for income transfer to small farmers
 - (iii) Subsidized credit will induce farmers to use modern inputs

The control measures adopted to realize the objectives above are summarized into five:

1. Creation of institutions to provide agricultural credit direct to farm operators (NACB – 1973; ADPs; Credit Units in State Ministries of Agriculture, State Credit Corporations; Commercial and Merchant Banks);
2. Concessionary interest rates to reduce the cost of capital with respect to agricultural loans (NACB operated concessionary rates of interest that were as low as 3 percent for on lending and 5 percent for direct lending between 1973-1979. The minimum rate of interest was 6 percent between 1980 and 1983, 7 percent in 1984 and 9 percent in 1985. These rates were between 4 and 6 percent lower than rates for the less preferred sectors);

Table 3: Summary of Government Incentives for Developing Micro-enterprises.

S/N	Incentives	Operating Agency	Objective/comments and status of Implement action
1.	Refinancing and Rediscounting Faculty (RRF) and Foreign Input Facility (FIF).	CBN and NEXIM	To provide liquidity to banks in support of their finance business directed on export promotion and development. RRF took off in 1987 and FIF in 1989.
2.	Currency Retention Scheme	CBN and Commercial/ Merchant Bank	Allow exporters to hold export proceeds in foreign currency in their bank. Took off in 1986.
3.	Tax Relief on interests earned banks on export	Banks and Federal Board of Inland Revenue	To encourage banks to finance exports by reducing their tax burden. Became effective in credit September, 1986
4.	Export Credit Guarantee and Insurance Scheme	CBN/NEXIM	Assists banks to bear the risk in export business, thereby facilitating export financing and export volumes
5.	Duty Drawback Scheme	Customs Dept. Standard Organization Of Nigeria, NEPC, Banks and CBN.	To reimburse custom duty paid by exporters on imported input used for Banks and CBN export production. This has Been widely utilized by exporters due to The cumbersome procedural requirements involved, although the fund was in 1988 increased to N50million.
6.	Export Expansion Grant	Nigeria Export Promotion Council (NEPC)	To encourage companies to engage in export business rather than domestic business especially exporters who can export N50,000 worth of semi-manufactured or manufactured products.
7.	Export price adjustment scheme	NEPC	This is a form of export subsidy designed to compensate exporters of products whose foreign prices become relatively unattractive to exporters due to factors beyond the exporters control.
8.	Subsidy for use of local raw materials	NEPC	To encourage exporters use local raw materials–still to be implemented.
9.	Export development fund	NEPC	To assist exporters in partly paying the costs of participation in trade fairs, foreign market research, etc. - This is an old scheme.
10.	Abolition of Export Licensing	Federal Ministry of Commerce and Tourism	To remove administrative obstacles from the export sector as much as possible - tourism has been effected.
11.	Supplementary allowance in favour of pioneer	Federal Ministry of Commerce and Tourism	To extend supplementary incentive to pioneer companies
12.	Accelerated depreciation and capital allowance	Federal Ministry of Commerce and Tourism	To extend supplementary incentive to industrial organizations for export of their products – starting in 1986
13.	Manufacturing –in- Bond Scheme	Federal Ministry of Commerce and Tourism	To assist potential exporters of manufactured products to import duty-free, raw materials for production of exportable products

- 3 Establishment of an Agricultural Credit Guarantee Scheme Fund in 1977 to guarantee loans granted by the Commercial and Merchant Banks from their own resources to the tune of 75 percent in case of default by agricultural borrowers;
- 4 Implementation of the rural banking scheme through the establishment of branches of banks in rural areas; and
- 5 Imposition of credit quotas and portfolio ceiling devices requiring commercial banks to lend a certain percentage of their loan portfolio to agriculture. This quota increased from 4 percent in 1970 to 20 percent in 1980 and was about 15 percent between 1990 and 1994.

146. However, the financial institutions have not fully complied with the control measures because of:

- (i) the high rate of loan default among the beneficiaries within which many beneficiaries capitalized on the ACGS fund as a license to default; and
- (ii) the concessionary interest rate that has defeated the whole aim of the credit control measures, because it is the claim of the banks that such a measure is incompatible with their cost structures.

Besides, financial institutions consider most agricultural projects non-viable, and feel that returns from agricultural lending are generally low. The failure of handlers of ACGSF to fulfill their obligation of absorbing 75 percent of default in loan repayments when the financial institutions made their claims worsened the full realization of the credit policy program of the government. Policy makers in Nigeria have been fully aware of the impact that access to financial assistance could have in improving the performance of small- and medium-scale enterprises especially in the agriculture sector. That is why, many well-meant credit policies have been in place in the country for a while now.

147. The establishment of many specialized financial institutions was designed to cater for the observed need among small- and medium-scale enterprises in Nigeria. Examples of these credit institutions are the Nigeria Agricultural and Cooperative Bank (NACB), the Nigeria Industrial Development Bank (NIDB), Community Banks, and Peoples Banks. Furthermore, as a deliberate policy incentive, the federal government of Nigeria established the Nigeria Export and Import Bank (NEXIM) to provide financial and technical assistance that Nigerian farmers would need in selling their tradable products in the world market. Apart from these, the Central Bank of Nigeria has issued financial guidelines to Commercial and Merchant Banks compelling them to provide necessary financing to small-scale producers. Among these were loan portfolio requirements, rural bank branches, and concessionary rates of interest for agricultural sector producers. Others are moratorium and loan guarantees by the agricultural credit guarantee scheme fund (ACGSF). Unfortunately, recent studies of rural small-scale industries in Nigeria show that many of them lack knowledge of government programs intended to assist small-scale enterprises. Lack of sufficient funds keeps the artisans from using improved tools and production techniques or regularize the flow of raw materials to reduce the delays in production, as well as improving the potential for employment promotion.

148. It is important to note that generally many credit policies in the country have tended to suppress the real rate of interest for both deposits and loans. For instance, faced with demands in excess of the funds available, the banking system has always responded by rationing credit and holding low-risk portfolios. Consequently, small and medium scale enterprises get excluded from the commercial credit market because of their higher

level of risk and greater unit cost of administering small loans. Also, government regulations on quality standards, technical specifications, and procurement exclude the outputs of small enterprises because they consider their inspection scale-wise unjustifiable.

Infrastructure development policy

149. The provision of infrastructural facilities was part of the general rural development policy aimed at making basic amenities accessible to rural communities to facilitate production and the orderly conduct of rural enterprises. The goal was to improve the living conditions in rural areas, enhance social and economic activities and stem the tide of rural-urban migration. Improvement in infrastructure and rural development has been prosecuted through several institutions and programs. The Directorate of Food, Roads and Rural Infrastructure (DFRRI) was created to provide rural roads, wells and bore holes. State and local government authorities are handling rural health centers and rural market development. Under the Agricultural Development Programs (ADP) systems, roads and other facilities are being provided to enhance input distribution and the evacuation of farm produce. The Better-Life Program, targeted at rural women, was to provide better facilities for post-harvest processing activities. These various efforts have failed, however to make the desired impact as a result of financial constraints, poor implementation of programs, frequent changes in administrative apparatus and poor maintenance of facilities provided. Other measures adopted by the government to alleviate the problems of inadequate financial resources and managerial inabilities of small-scale industries are discussed below.

Industrial development centers (IDC)

150. These are core agencies responsible for providing free managerial, technical and other assistance to small-scale industries. The objective of IDC is to render out the sport assistance and guidance to small industries on process techniques, selection of machinery and equipment, training and management. The main functions of the IDCs as outlined in the Second National Development plan are:

- ❑ Technical appraisal and loan applications/preparation of feasibility studies;
- ❑ Provision of Industrial Extension Services;
- ❑ Training of entrepreneurs and staff including management training;
- ❑ Applied research into industrial products involving design of products for small-scale industries;
- ❑ Provision of facilities for managerial training as well as consultative and extension services to proprietors and managers of small-scale enterprises;
- ❑ Assistance of small scale enterprises in bulk purchasing of raw materials;
- ❑ Assistance in plant installations and servicing; and
- ❑ Provision of assistance to state governments in the supervision of the small-scale industry credit loan scheme.

National Directorate for Employment

151. This program came into existence in 1986 and was expected to grant loans to individuals and provide training facilities for people in various fields. Recently, a national bank, known as the *Peoples' Bank* was established to cater for the needs of the poor who require small loans to start and/or sustain their businesses. A unique feature of the Peoples' Bank relates to the fact that loans are given without the usual stringent bank conditions.

Better-Life-for-Rural-Women program

152. This was another program that was established to support micro-enterprise development in the rural sector. It was designed to assist rural women in agricultural production, small-scale industrial production, and non-agricultural enterprise training. The program was discontinued in 1994 and replaced by a similar one that is more embracing in scope. The new program is called the *Family Support Program (FSP)* and its main objective is to provide cheap financial credit to small-scale producers in the rural areas without gender bias.

Tax Policy

153. In an effort to create incentives for private investment in all priority sectors, including agriculture, the government of Nigeria introduced some tax policies:

- In 1987, the tax rate was reduced to 20 percent for businesses operating in manufacturing, agriculture and mining; and
- Capital allowances on machinery and equipment used in agriculture, manufacturing, construction and transport were increased; while
- In 1993, personal income tax exemption was granted to those earning N5000 or less per annum, and marginal tax rate was reduced from 45 to 35 percent.

Since 1998 more liberal tax exemptions and allowances have been granted to all salaried workers in the country in an effort to improve their take-home pay and increase their purchasing power. This tax policy has had desirable effects especially with respect to social peace and harmony in the economy.

E. Institutional and market opportunities for micro-enterprises in Nigeria

154. *The Agricultural Development Programs (ADPs)*

The network of ADPs started in 1975 with only three enclave projects but has since been increased to 31 (so that there is one per state and Abuja). The World Bank, the Federal Government, and the State Governments finance the ADPs jointly. One of the main functions of the ADPs is to provide extension services to small-scale farmers in the rural areas. In addition, they are the established state government agencies that supply needed farm inputs (fertilizer, improved planting materials, etc.), and construct feeder roads for enhancing the transportation of agricultural produce from rural to urban areas. They also develop other infrastructure in the rural areas where they concentrate.

155. *National Agricultural Insurance Company (NAIC)*

This was established in 1987 as an institutional arrangement for tackling the problem of small farmers who were unable to satisfy the collateral requirements of banks when seeking for loans. Official thinking was that the insurance scheme would go into agricultural investment. But the scheme is still in a pilot phase with insurance covers being available for only maize, rice, poultry and cattle.

156. The *National Economic Reconstruction Fund (NERFUND)* was established in 1989 to finance medium and long-term investment loans to small and medium scale enterprises (SMEs) in order to bridge the perceived gap in bank lending to SMEs. The specific focus of NERFUND is supposed to be on the:

- Provision of soft, medium to long-term funds for wholly Nigerian owned SMEs in manufacturing and agro-allied enterprises, mining, quarrying, industrial support services, equipment leasing and other ancillary projects;
- Provision of medium to long-term loans to participating commercial and merchant banks for on-lending to SMEs;

- Facilitation of the provision of loans with 5-10 years maturity including a grace period of 1-3 years, depending on the kind of enterprise/project; and
- Provision of loans in local and/or foreign currency depending on the funds available to the project being funded.

To be eligible, an enterprise must be 100 percent owned by a Nigerian. For this purpose, SMEs are defined as those enterprises with fixed assets and cost of new investment (excluding land) not exceeding N36 million, and obtaining not less than 60 percent of their raw materials locally in the case of manufacturing companies. Finally, participating banks are expected to assume credit risks on behalf of SMEs. Small and medium scale projects located in rural areas are generally usually accorded priority.

F. Strategic options for enhancing micro-enterprise performance in agriculture

157. In recognition of the potential of micro-enterprises as a source of economic growth in the agriculture sector and resilience in the economy, savings accumulation/capital formation, and employment generation, a number of strategic options have been adopted and can still be applied to enhance the sector's performance. For instance, a few state governments in Nigeria have started implementing poverty alleviation programs that encourage entrepreneurship generally and female entrepreneurship in particular. Such programs include the following elements:

- Provision of credit;
- Technical training for improving agricultural productivity and output quality;
- Managerial training;
- Action to facilitate more women's involvement in economic activities through the organization and funding of various supporting social activities such as child care and group discussions to develop better social awareness of women's economic roles in society;
- Marketing assistance especially in relation to agricultural produce;
- Actions to facilitate the establishment of women's groups including an early start to improve girls' access to education and training in modern technical skills as well as in leadership; and
- Assistance to set up new enterprises or upgrade existing ones.

In order to effectively implement the above-suggested elements, it is necessary to train officials in many public departments, banks and other lending institutions that have anything to do with micro-enterprise development to recognize the economic potential of small-business entrepreneurs, especially women entrepreneurs. Furthermore, there is need to build up networks and ensure appropriate co-ordination between all relevant government and non-government departments and institutions in the field of business promotion and development (credit, technical and managerial training, choice of technology, input procurement, legal counseling, marketing, and management). *This is one area where the USAID/N can assist Nigeria during the implementation of its Transition Initiative.*

158. Finally, there is an urgent need to conduct household or ad hoc surveys through which to strengthen the collection of detailed information and data on the many aspects of micro-enterprise existence and development in the country, including:

- The distribution of these enterprises;
- The gender participation in micro-enterprises;
- The nature and extent of such participation (especially by women) as owners and managers of these businesses;

- The entrepreneurs' motivations, constraints, strong points, individual strategies, time allocation, and stratification;
- The linkages between the various categories of micro-enterprises and the rest of the private sector; and
- The effectiveness and efficiency of existing assistance and support mechanisms.

Given its potential impact on agricultural development and productivity, this again is an area in which USAID/N could assist the government of Nigeria.

G. Micro-finance and agricultural micro-enterprise development in Nigeria

159. As has been noted above, given a good policy and regulatory framework, access to credit has continued to be the primary constraint to micro-enterprise development in Nigeria. However, available indications are that the country's micro-finance sub-sector itself remains poorly organized and inefficiently operated. For instance, a recent assessment of Nigeria's micro-finance sub-sector by the USAID Office of Micro-enterprise Development in February/March, 2000 reveals the following facts about the sub-sector:

- Although informal and semi-formal savings and credit groups (e.g. "esusus", rotating savings and credit societies, etc.) exist in parts of the country, large areas of Nigeria are virtually unserved by micro-finance institutions (MFIs);
- Many NGOs base their methodologies on the traditions of these savings and credit groups;
- State-sponsored cheap credit has greatly distorted the market through the provision of highly-subsidized loan programs in an effort to crowd out private money-lenders with extortionate tendencies;
- Savings mobilization remains underdeveloped, with savings used as collateral rather than as a source of lending capital or a service valued in itself by clients;
- Small entrepreneurs and rural households are often reluctant to save in formal institutions because of past experience with failed government financial institutions such as many community banks;
- The level of institutional development among Nigerian MFIs is mixed such that the very large ones have a low level of institutionalization while the smaller ones are still strongly dominated by their founders;
- Many of the MFIs have limited specialization and yet offer a variety of non-financial services such as training, education and health services;
- Along with the huge management challenges engendered by offering such diverse services in a high-quality manner, this lack of separation of activities makes it difficult to sort out the true level of self-sufficiency of the micro-finance operations;
- Most MFIs have not achieved significant market penetration and only a few have reached national scale in operation;
- Although only a few donors (Ford Foundation, the German Ecumenical funder EZE, and UNDP) have had a sustained engagement in micro-finance, their awardees have been quite dependent on their operating and capital grants to support their growth and development;
- While support by the government of Nigeria for the micro-enterprise sector has been limited, its involvement in rural finance and poverty alleviation has been often been extensive;
- Government's direct involvement in the sector through its poverty reduction grants scheme and unsustainable state-sponsored rural financial institutions such as the National Agricultural and Cooperative Bank (NACB) and Peoples' Bank has

undermined the private micro-finance market-subsidized interest rates, lack of focus on loan collection and politically-motivated lending; and

- With the advent of democracy in Nigeria, a number of donors are now expressing interest in supporting MFIs or starting new enterprise/community development finance activities that could affect NGO MFIs.

160. The USAID team that conducted the above assessment identified some important strengths and weaknesses in the MFI sector. *The strengths* include the facts that:

- Grass-root organizations in the sub-sector have strong popular support;
- Several very large institutions and industry-wide clients of this sub-sector rival those of the most developed micro-finance sectors in Latin America;
- These institutions are successful home-grown financial models that build on traditional forms of organization and financial services;
- Best practices are being adopted ad hoc by top-performing MFIs (e.g. inviting a well-known international rating firm to rate their institution);
- There is willingness on the part of some MFI managers to learn from and adopt best practices methodology;
- Some of the MFIs show desire to professionalize or specialize in the micro-finance field;
- Some MFIs are testing innovative approaches and products;
- There are proactive efforts to develop performance standards, rating, self-regulation, and code of ethics;
- For many MFIs, the infrastructure of support institutions are in place; and
- There are proactive nascent efforts to develop common positions on micro-finance policy and regulation and pursue advocacy with the Ministry of Finance, Central Bank of Nigeria, etc.

161. *The identified weaknesses* of MFIs are:

- Limited depth and capacity to manage growth, specialization, and institutional transformation;
- Potentially problematic underdeveloped governance structure and performance measures and systems;
- Relatively little organized market research and new product development;
- Human capital strained by growth and requiring on-going training and professionalization;
- Relatively little competition for clients;
- Inadequate information and other management systems;
- Liquidity constraints which limit MFI expansion;
- Interest rates that are not cost-recovering and so limit ability of the MFIs to achieve sustainability and offer attractive savings products, etc.;
- Lack of specialization in finance (social services, training, and credit);
- High transaction costs;
- Inherent delays usually associated with processing small loans;
- The fewness of rural branches of lending institutions;
- Low profitability of agricultural micro-enterprises which makes repayment difficult;
- High risks associated with operating micro-enterprises with low return on investment especially in the rural environment.

162. In order to tackle these problems, government has over the years, instituted a number of micro-finance programs and strategies, namely:

- The promotion of self-help groups among SMEs and the upgrading of such informal arrangements by linking them with the banking system and other financial services;
- The promotion of savings in rural areas through cooperative formation;
- The provision of convenient banking services with subsequent linking to specialized lending institutions;
- The provision of savings subsidy to mobilize deposits.

These programs have, however, not yielded desired results because certain elements that are character-based and which reduce risks and costs are lacking. Such elements include:

- The non-existence of solidarity groups;
- The absence of individual (personal) guarantees;
- The non-prevalence of up-front savings and small but frequent repayments;
- The non-adoption of a program technique that starts out with small loans and then follows them up with larger repeated loans to good clients; and
- The non-use of informal associations (such as savings and credit associations) and semi-formal associations (such as NGOs, savings and credit cooperatives) for loan recovery.

163. In order to increase access to micro-finance by micro-enterprises, Steel (2000) recommends adoption of the following approaches:

- (i) *Use NGOs and other specialized financial intermediaries*
 - to act as a perpetual financial intermediary network for micro-enterprises;
 - to develop an organization of self-sustaining independent enterprises that respond to local needs; and
 - to adopt dynamic best practices that will scale up and reach out to network members for continuously increasing synergy.
- (ii) *Establish low-income clients that will*
 - have access to information and services;
 - join organizations that provide support to increase income; and
 - establish long-term relationships with solid financial intermediaries.
- (iii) *Use donor and development agencies that will*
 - build sustainable institutions to operate the micro-enterprises;
 - develop financial systems that work for the majority of these enterprises;
 - support retail institutions that meet agreed standards of performance and client reach directly and through network arrangements.
- (iv) *Convince government to*
 - encourage autonomous retail micro-finance institutions at grassroots;
 - liberalize interest rates to cover costs of small loans and stimulate savings;
 - introduce flexible regulations that encourage different micro-finance institutions to serve different niches.
- (v) *Work with banks to*
 - see market opportunities for micro-enterprises;
 - make changes in organizations, systems, and products to reduce costs and risks of lending to this large and growing client group; and
 - establish bank-NGO-client credit lines.

V. PRIVATE-SECTOR AGRIBUSINESS DEVELOPMENT IN NIGERIA

A. Types and volume of agribusiness enterprises in Nigeria

164. Agribusiness enterprises in Nigeria span the entire agricultural production, processing, distribution and consumption spectrum from farm input suppliers through farms themselves, wood production, furniture manufacturing, food processing, food packing and packaging, food transporting, and food marketing companies to restaurants. More than 70 percent of all businesses operating in the country are, in fact, agribusiness concerns in form and/or typology. This, of course, confirms that the economy of Nigeria is primarily agricultural and is supported by the operations of agribusiness enterprises. These companies, in essence, coordinate the activities of all those that operate the food and fiber system (including wildlife and fisheries) and the non-food system (including forestry and its derivative products) in the country.

165. Functioning agribusiness enterprises in the country may be classified into four major groups, namely:

- Farming input supply companies;
- Producing farm firms;
- Food processing agribusiness firms; and
- Food marketing and distribution agribusiness organizations.

Within these four major categories may be identified twenty two individual types of agribusiness firms handling the various assorted goods and services that make up what comprises agricultural business in the country. The agribusiness industry of the country is a set of vertical activities that are very closely related all along the line. Thus, their development is critically linked to that of the entire country. The fact that almost all (over 99 percent) are in the private sector is a good omen for the sector's growth/development.

166. The breakdown below shows the firms in each agribusiness category in the country.

Farm input supply businesses comprise:

- *Agricultural chemical input suppliers* of fuels, fertilizers, pesticides and herbicides such as the petrol companies and the Nigerian Agricultural Fertilizer Company (NAFCON), and CAPL;
- *Seed and feed concentrate suppliers* such as Premier Seed Company Ltd., Leventis (Agriculture Division), Pfizer, Ladokun Feeds, and Farmer Cooperatives throughout the country;
- *Agricultural machinery and equipment suppliers* such as Leventis Technical, UAC, BEWAC, CFAO, SCOA Ltd., Dizzengolf, and Gottschalk;
- *Automobile tube, type and foam manufacturers* such as Michelin, Dunlop, Odutola, and Ugo Tire Industries; and
- *Credit and veterinary services suppliers* such as community and commercial banks and veterinary departments and clinics.

Among *the producing farm firms*, there are:

- *Crop producers* of maize, millet, sorghum, hay, tobacco, yams, cassava, cowpea, soybean, cotton, cocoa, palm oil and kernel, oranges, flowers and vegetables, etc.; such as all the farmers scattered all over the country;
- *Livestock producers* of chicken, turkey, eggs, beef and diary cattle, milk, pigs, sheep, goats, etc.; such as Obasanjo Farms, Mitchell farms, etc.

Food processing agribusinesses in the country include:

- (i) *Food canners* such as UAC Foods, Vegfru, Quality Foods;

- (ii) *Beverage manufacturers* of beer, soft drinks, cocoa drinks (like Milo, Ovaltine, Chocolate drink), coffee, tea, etc, such as Cadbury, Nigeria Breweries Plc, Guinness Plc, Nigeria Bottling Company, etc.;
- (iii) *Confectionary producers* of sugar, sweets, chocolate, cakes, biscuits, etc, such as Bacita Sugar Company, UAC Foods;
- (iv) *Tobacco Processors and/or Manufacturers* such as Nigeria Tobacco Company (NTC) and Phillip Morris;
- (v) *Meat processors* such as Zatech (Nig.) Ltd. and Kaduna Cold Storage Commission;
- (vi) *Wood Processors and furniture makers and distributors, paper millers and tissue paper manufacturers* such as Nigeria Paper Mills;
- (vii) *Leather and footwear manufacturers* such as Bata Shoe Factories and ;
- (viii) *Food packaging and cartons manufacturers/ suppliers* like Containers & Cartons (Nigeria) Ltd.;
- (ix) *Cotton processing and textile (yarning and weaving) companies* such as ABC Cotton Ginners, AREWA Textiles, and West African Textiles;
- (x) *Food processors of corn flakes, jam, bread, butter, milk, margarine and tomato puree* such as NESTLE (Nig) Plc, ;
- (xi) *Oils, soap and toothpaste manufacturers* like Lever Brothers, Beecham, etc;
- (xii) *Fishing companies, fish processors, packers and distributors* like Ibru Fish Industries, Coastal Trawlers (Nigeria) Limited, Danjuma Fishing Company.

Food marketing and distribution agribusiness companies in the country include private food stores, wholesaler, and retailers of frozen foods, turkey part, etc., such as farmer co-operatives, and super markets.

B. Major issues governing the development of agribusiness in Nigeria

167. Six issues primarily govern the development of Nigeria's agribusiness sector, namely:

- National and regional policies affecting operations in the sub-sector;
- Local, regional, and global markets for the sub-sector's products;
- Level of "value-added" to the sub-sector's output;
- Capacity building needs of the sub-sector;
- Effectiveness and efficiency of the finance sector to agribusiness development;
- Level of competitiveness in the sub-sector.

168. *With respect to national and regional policies*, there is no separate policy articulation for the development of agribusiness except for the brief objectives stated in Section 4.6 (page 46) of the 1988 *Agricultural Policy for Nigeria* document for agricultural commodity processing. The stated objectives of that section of the agricultural policy document are:

- i. To widen the demand base for agricultural commodities and, hence, accelerate the rate of growth of the agriculture sector;
- ii. To preserve perishable agricultural commodities thereby reducing their level of waste and degree of seasonal price fluctuations; and
- iii. To diversify employment opportunities in the rural areas through the establishment of rural-based, small-scale agricultural commodity processing industries.

Other than these broad statements, there is no specific articulated national policy that focuses on the development of agribusiness as an important sub-sector - especially in the areas of agricultural commodity quality standardization, storage, processing, packaging, packing and marketing. Consequently, there is also no harmonized sub-regional and regional policy that supports a programmed and targeted development of the agribusiness sub-sector.

169. *With respect to local, regional, and global markets available for Nigeria's agribusiness products, Table 4 summarizes the extent of these potential markets. These estimates are based on field responses and demand indications. As the table shows, there is a huge untapped local market for both processed and unprocessed agricultural products in Nigeria. All that appears to be needed is some planned organization of the country's agribusiness sub-sector such that it provides, in a sustainable manner, goods that meet these various demands. With a little processing or semi-processing to add value to many of Nigeria's agricultural raw materials, many resulting agribusiness products (especially those from cassava, yams, groundnuts, fruits, maize, etc.) can be easily sold within the West Africa sub-region. Furthermore, recent market surveys by some States in the Federation have confirmed that there are potential export markets for groundnut cake, cassava chips/pellets and cassava starch for livestock feeding in Europe.*

170. There is little or no “*value-added*” processing going on in the agribusiness sub-sector of the economy. Most of Nigeria's agricultural products are exported raw with no value added. As a consequence, many Nigerian agricultural products are either sold at very low prices within and outside the country, or are allowed to rot/waste away in the farms and local markets. Local entrepreneurship in this particular sub-sector appears lacking because of the large capital investment and long gestation period often needed to obtain reasonable and profitable results. The countryside is replete with abandoned agricultural processing and semi-processing facilities established some years ago but later found to be unprofitable. Consequently, commercial banks are not excited about or interested in funding agro-industrial processing facilities in the country although the country is blessed with raw materials begging for processing before sale. What is needed here is, therefore, a dedicated program that will ensure that a few determined entrepreneurs are adequately encouraged through sufficient funding to establish agricultural processing plants.

171. *With respect to capacity building needs of the agribusiness sub-sector of Nigeria, two major areas need special attention. These areas are post-harvest infrastructure and human technical capacity needs that relate to the agribusiness sub-sector. Capacity building in relation to infrastructure concerns the ability to have and maintain economic (processing, storage and distribution) and social (communications) infrastructure, domestic input/output markets, and general agribusiness development. Practical experience in Nigeria indicates that poor communications and market infrastructure greatly contribute to and compound the effects of technology on agribusiness. Other than the radio, modern communication facilities are virtually nonexistent for the largely illiterate rural populations. The negative impact of poor communications infrastructure is further compounded by major weaknesses in upstream (inputs) and downstream (processing) supporting industries and markets for the major crop and livestock sub-sectors. The adoption of promising agricultural technologies is often jeopardized by lack of efficient manufacturing of necessary agribusiness equipment and spare parts. There are few industrial units to process agricultural commodities despite a growing demand for traditional food-grains, feeds and livestock products. Past efforts in these fields have mostly failed, mainly because of their excessive, large-scale import-substitution orientation and poor management of the majority of the public-sector plants (e.g., the over-scaled mills for rice and imported wheat). In the present era of reforms in favor of shifting to market economies, Nigeria is faced with the liberalization and privatization of a costly industrial base too idle to sustain modest growth in basic traditional foods.*

Table 4: Rapid Assessment of Market Potential for Selected Agricultural Products of Nigeria

NO	COMMODITIES	PRODUCTS	DEMAND		
			LOCAL	REGION	INTERNATIONAL
1.	Cereal				
	Maize	Flours/Bakery	+++	+++	+
	Rice	Bread	+++	++	=
	Sorghum	Weaning foods	++	=	=
	Millet	Alcohol/brewery	++	+++	++
		Cooking oil	+++	++	+
		Confectionaries	+++	++	=
		Starch	+++	+++	+++
2.	Root and Tuber				
	Cassava	Local feeds	+++	++	+
	Yam	Flour (gari)	+++	++	+
	Sweet Potato	Chips	+	=	=
	Potato (Irish)	Feed/Livestock	+++	++	+
	Starch		+++	++	+
	Extruded products		++	=	
	Bakery		++	+	=
3.	Grain Legumes				
	Groundnut	Cooking oil	+++	+++	+
	Soybean	Weaning foods	+	+	=
	Cowpea	Protein concentrate	++	++	+
		Milk	+++	++	=
		Soy cheese	++	+	=
		Composite flour	++	+	=
	Feed/livestock	+++	++	=	
4.	Fruits & Vegetables				
	Mango	Juice	+++	+++	+
	Orange	Jam	+++	+++	+
	Papaya	Dried fruits	+	+	=
	Banana & Plantain	canned and dried	=	=	=
	Vegetables		+++	++	=
	Oils		+++	++	=
5.	Oil Crops				
	Palm oil	Oil	+++	++	+
	Sun flower	Soap	+	+	=
	Cotton seed	Butter	++	+	=
	Others	Feed/livestock	++	+	+
6.	Livestock				
	Small ruminants	Meat	+++	++	=
	Beef & dairy animals	Milk	+++	++	=
	Fish	Cheese	++	+	=
	Poultry	Feed	++	+	=

Note: = None; + Low; ++ Medium; and +++ High

Source: June/July, 2000 Field survey

172. Agricultural input markets in the country are characterized by two additional drawbacks. First, marketing stages and channels for major purchased inputs and implements (equipment, fertilizers, pesticides, seeds, etc.) have been for a long time under heavy public-sector control, either directly through specialized public-sector enterprises, or indirectly within the multiple mandates of official rural-development agencies. Because of their effects of distorting agricultural incentives, the poor policies, practices and management of these agencies came under severe criticism with regard to their roles in input procurement, pricing and distribution. Under this pressure, most of the public-sector enterprises and agencies concerned have been or are in the process of being dismantled. Financial, technical and knowledge constraints as well as unstable expectations, however, prevent private traders from assuming a greater role in agricultural input marketing. Thus, current trends toward economic liberalization and greater private-sector participation in the market will likely have a long gestation period before yielding full effect. Second, poor performance is caused by inefficiencies in agricultural credit markets. These are generally characterized by the duality of a bureaucratic and inflexible formal (public bank/agency) component and a weak/poorly-known informal component. Financial scarcity in the official networks results in tight credit rationing with restrictive and politically biased access. On the private side, there is no conclusive evidence to indicate that the assumed sizable savings circulating through informal channels can be easily directed toward investments in the agribusiness sub-sector.

173. Downstream in the farm and pastoral production stages, there are major drawbacks in output markets. In most of the last three decades, monopolistic public marketing boards dominated them. Increased pressures on the government have caused restructuring of these domestic agricultural markets. The inhibiting effects of the public sector (pan-territorial pricing and marketing policies) on farmers' incentives and consumers' access to agricultural commodities (especially food grains), have made market liberalization the single most important feature of the agribusiness development strategies of the 1990s and 2000s. As public-sector marketing boards have been withdrawn from direct commercial functions (administered-price formation, purchases, storage and sales), their role has been restricted to the supply of market facilitating public goods, such as market information, credit-access mediation and training for private traders, commodity grading, etc. Beside the severe restrictions imposed by a generalized financial crisis (debt-induced structural adjustment) on the entire spectrum of economic activities in Nigeria, the overall efficiency and cost-effectiveness of the private marketing sector has yet to overcome on unstable environment. This environment is still characterized by persistent distortions, which are primarily reflected by ambiguities, inappropriateness and frequent changes in the formulation and the enforcement of the legal foundations (laws, rules and regulations) of the emerging market economy in the country.

174. Fiscal contraction under the country's stabilization and adjustment programs has caused a reduction in resources available for the provision of economic and social infrastructure. The nature and magnitude of the impact of changes in infrastructure development necessitated by the reforms on small farmers varies from state to state and between local government areas. These changes, however, pose real challenges to agribusiness development and transformation. An increase in investment in rural road infrastructure could increase farmers' access to transport both as transport availability increases and as transporters pass on their savings on operating costs to consumers of

such services. Conversely, a decline in such physical infrastructure could adversely affect markets, raise costs and lower the availability of incentive goods. Poor infrastructure could cause a lack of competition in markets. Transport costs could also limit export options for the country. The end result is to discourage production and processing/semi-processing of cash and/or food crops.

175. *Capacity building for the technology component of agribusiness development and transformation* calls for a massive investment in producing adequate stock of local talents to man the technical processing component of the sub-sector. The relative success in agricultural technology production, borrowing and transfer achieved in the production segment of agriculture has not yet been transmitted to the post-harvest processing component of the continuum. The vacuum that exists in the post-harvest agribusiness sub-sector cannot be filled by the introduction of international research centers in the country. In fact, the few post-harvest technological innovations generated by the international centers in the country can hardly contribute to transforming the agribusiness sub-sector. Thus, national institutes like the Federal Industrial Research Station, Oshodi (FIRO) must be made more functionally oriented toward the production of practical equipment needed by the processing sub-sector of Nigeria's agribusiness. Users of new processing technologies have to be trained, and such equipment must be made affordable and accessible to consumers.

176. *With respect to the effectiveness and efficiency of Nigeria's finance-sector contribution to agribusiness*, existing funds lending conditions do not favor agriculture. For the finance sector to contribute efficiently and effectively to agribusiness development, it must be sustainable. In other words, it must be viable, self-reliant/self-sufficient, broad in outreach, and able to impact reasonably on the poor. Currently, both the micro-finance and established macro-finance apparatus in the country do not fulfill these requirements. Loans to the sub-sector are few and inadequate. MFIs that service the sub-sector are themselves unable to cope with the demand for funding by enterprising operators in the sub-sector.

C. Strengths and weaknesses of Nigeria's agribusiness establishments

177. Agribusiness establishments in the country have both strengths and weaknesses that critically affect their operations. The weaknesses, however, far outweigh the strengths both numerically and operationally. *The strengths* of the sub-sector derive from the fact that Nigeria is primarily an agricultural country, and include:

- The ease with which each agribusiness company can access necessary raw materials;
- The availability of technical manpower that may be needed to service the sub-sector;
- The strong entrepreneurial capacity of the operators in the sub-sector;
- The fact that over 98 percent of all agribusiness establishments are home-grown and private-sector owned and operated; and
- Willingness on the part of entrepreneurs to develop agribusinesses into world class and competitive entities if funds are provided.

On the other hand, *the weaknesses* of these agribusinesses include the facts that:

- Over 95 percent of the key operators in the sub-sector are poor (primarily women) and not in a strong bargaining position to influence policy;
- The current policy environment is mostly inimical to these numerous operators;
- Investment climate and incentives in the sub-sector are not sufficiently attractive and conducive to the growth and development of the sub-sector;
- The basic infrastructure (roads, electricity, water, micro-finance network, etc.) essential to agribusiness operations are grossly poor, inadequate or lacking;

- The sub-sector is not yet price-competitive;
- There is generally low resource productivity in the system; and
- The sub-sector has poor service linkages to the finance, technology fabrication, and export sectors of the economy.

178. With respect to the weaknesses, it is important to note that generally, women play the most crucial role in agribusiness enterprise development in the country. Available statistics from the ILO (1995) indicate that about 60 percent of all agribusiness firms in Nigeria are established and operated by women. Unfortunately, however, in their efforts to promote gainful self-employment and operate agribusiness micro-enterprises, these women face certain constraints. According to the ILO *African Employment Report 1995*, most of these constraints are gender-specific and include:

- *Behavioral barriers* which make women operators have little self-confidence and a negative self-image;
- *Educational barriers* which make women attain relatively lower education levels, receive a biased education, and usually have limited access to vocational training opportunities;
- *Infrastructure barriers* which deny them access to credit, technology, support services, land, and information;
- *Legal barriers* which make independent legal action limited for women;
- *Occupational barriers* which cause women to have fewer opportunities in the formal sector for skill development;
- *Role-related barriers* which arise because of conflicting role demands and time constraints on women; and
- *Social and cultural barriers* that promote negative attitudes towards women in business demand that women must fulfill other roles, restrict them as to the choice of sector, and increase their lack of family support and mobility.

179. Most of these constraints have socio-cultural origin, and so require deep-rooted attitudinal changes in the socio-cultural environment. Despite these observed constraints, many women still become self-employed by setting up agribusiness micro-enterprises. Thus, for a proper development of the agribusiness sub-sector, women-headed enterprises should not be viewed in isolation from the economic and socio-cultural context in which they evolve. The establishment, survival and growth of women-headed enterprises are all crucially affected by societal values such as under-valuation of women's economic role, sex-role stereotyping, and women's limited access to certain types of vocational training, industrial policies and legislation.

D. Agribusiness organization and the food system in Nigeria

180. The food system of Nigeria is the organized agribusiness arrangement that brings together the inter-related parts of the agriculture sector for the purpose of achieving the united goal or stated objectives of the sector. The food system of the country is thus a composite of three different levels of agribusiness organization, namely:

- (i) The *farm input supply businesses* that provide manufactured inputs for farmers;
- (ii) *Farming itself* which is the nucleus of agriculture; and
- (iii) *All the processing, storage, transportation and other marketing business enterprises* that convert raw farm commodities into food and fiber products.

In essence, therefore, the food system of this country is a set of vertically related activities whose flow of goods and services are complementary. Some of these activities occur on farms and are managed by farmers; others occur outside farms and are managed by non-farmers. *Figure 3* summarizes these vertical relationships. From the top of the

Figure (3) downward, one visualizes the various kinds of goods and services produced within the food system. Outputs at one level become inputs for the level below it. The ultimate aim of the system is to provide food and fiber that consumers want to buy and at the proper place and time.

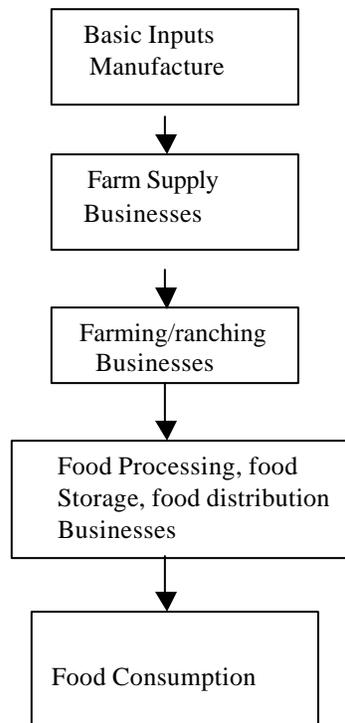


FIG 2: Vertical Relationships in Nigeria's Food System

181. Unfortunately, there are many organization problems associated with the operation of the food marketing system in Nigeria. These problems may be classified under four main areas, namely:

- i. Production, harvesting, packing, and processing problems;
- ii. Transportation problems;
- iii. Final exchange/distribution problems; and
- iv. Government policy interventions and entrepreneurial reaction problems.

Under the first category (harvesting etc.), the identified problems include those of:

- The use of improper production, harvesting and selection techniques;
- Non-adherence of farmers to harvesting schedules;
- Late and/or inadequate provision of packing and packaging materials or containers;
- The application and use of deficient production techniques and packing procedures;
- The non-availability of proper processing techniques;
- Lack of refrigeration; and
- The near complete absence of local processing and refrigeration equipment suppliers and maintenance crew.

182. *In the second area (transportation), the marketing problems of the food system are:*

- Inadequate availability and poor design of transportation facilities which result in
- High costs of transportation of food items;
- Lack of proper hauling arrangements to provide loads for trucks during return trips; and

- A high rate of in-transit damage to agricultural produce leading to a rejection of over 40 percent of such produce.

Under the third category (final exchange), the problems identified include those of:

- The smallness of local markets where the final exchange is effected;
- The ignorance of buyers and sellers of the market conditions and situation due primarily to their illiteracy;
- Poor communication and lack of information between markets on the one hand and between producers and consumers on the other hand;
- Inadequate control of products once produced and supplied to the middlemen; and
- Greed and fraud of sellers (middlemen) especially those that control the importation of certain restricted but highly demanded commodities under classified licensing.

In the fourth area (government policy intervention and entrepreneurial reaction) the major problem is that of disruption of the marketing system caused by well-intentioned government policy interventions. Such disruptions usually arise from the attitude of the average businessman who is prepared to find ways and means of thwarting government regulations.

183. Each of the above marketing problems has its individual impact on the system, but its relative criticality lies in the fact that a weakness in one part of the defined food system debilitates the functioning of the entire agribusiness sub-sector. Coupled with the problems identified above, there is the general non-planning and non-coordination that result from a total lack of a systems approach to marketing foodstuffs in the country. These weaknesses cause costly delays, simultaneous inventory gluts and shortages of foods in various parts of the country, poor quality maintenance and expensive imbalances in the distribution and use of transport facilities.

D. Planning, developing and enhancing agribusiness in Nigeria

184. Planning and developing Nigeria's agribusiness require adopting a commodity systems approach. This on its own requires identifying the major agricultural commodities produced and processed in the agriculture sector of this country. In this regard, it is relevant to note that the major agricultural commodities of Nigeria are: cassava, yams, rice, maize, millet, guinea corn, rubber, cocoa, palm oil, palm kernel, tobacco, sugar, oranges, mangoes, pineapple, plantains and bananas, cashew nuts, soybeans, cow-peas, tomatoes, leafy vegetables, small ruminants (sheep and goats), cattle, poultry. Most of these crops are processed or semi-processed into foods that are demanded both locally and internationally. Some are processed into more foods than others. Cassava, for instance, is processed into five different foods (*garri, lafun, fufu, abacha, and ebelebele*) that are consumed locally in different parts of the country. Other food crops like yams, millet, guinea corn, maize and plantains are processed into one or two food items demanded locally. Industrial crops like cocoa, rubber, oil palm produce, tobacco and sugar are also processed/semi-processed into forms that are demanded both locally and internationally as either final consumer forms or inputs for some other manufacture. In the case of the industrial/export crops, the processing is usually done by agribusiness concerns (like Vegfru, Quality Foods, Cadbury, UAC Foods, Bacita Sugar Company and others listed earlier) that are large enough to operate as exporters.

185. The degree and volume of processing of each of the food crops are, however, low because of the processing equipment available at the village or local level. In most instances, the quality of such processed food items is crude and could be greatly improved. If more modern and higher-capacity processing equipment were made available to the producers and processors of these crops, many of these crops could be

processed into more refined foods. Thus, the way forward for agribusiness enterprise development in Nigeria is to recognize the potential contribution of the development of these crops towards national growth, economic resilience, savings accumulation/capital formation, employment creation, etc. The various tiers of government in Nigeria need to start implementing specific programs that generally encourage entrepreneurial-capacity building for all investors (but especially female agribusiness investors) that are engaged in the production, processing and marketing of these crops and livestock.

186. Such programs should incorporate the following elements:

- Provision of credit;
- Technical training for improving productivity and quality of output;
- Managerial training;
- Action to facilitate more women's involvement in economic activities through organizing and funding various supporting social activities like child care and group discussions to develop better social awareness of women's economic roles in society;
- Marketing assistance;
- Actions to facilitate the establishment of women's groups including an early start to improve girls' access to education and to training in modern technical skills as well as in leadership; and
- Assistance to set up new agribusiness enterprises or to upgrade existing ones.

In order to effectively implement the above-suggested elements, it is necessary to train officials in many public departments, banks and other lending institutions that have anything to do with agribusiness development to recognize the economic potential of their entrepreneurs, especially women entrepreneurs. Furthermore, there is a need to build up networks and ensure appropriate co-ordination between all relevant government and non-government departments and institutions in the field of business promotion and development (credit, technical and managerial training, choice of technology, input procurement, legal counseling, marketing, and management).

187. There is a need to establish, within each of the six geopolitical zones in the country, an agribusiness industrial park whose principal focus should be to promote agricultural-input industries and commercial crops, ensure food security, enhance agricultural productivity, increase competitiveness, and attract needed resource flows into agricultural industries. Such parks should be able to unveil viable avenues for enhancing value-added products while increasing the degree of local processing. They should also demonstrate how the country's industrial complementation could be achieved. This is another important area in which USAID/Nigeria could assist the country.

188. Finally, experience shows that Nigeria's past public development efforts at assisting the agribusiness sub-sector have centered on large projects. These efforts have summarily failed to meet desired goals or objectives. For instance, social funds budgeted for and spent in the various states have failed to work because of non-transparency of handlers and improper application of such funds. In the last 15 years alone, federal and state governments have spent over US\$50 million funding large projects that have proved irrelevant to the intended beneficiaries. There is need, therefore, for the governments to refocus by reassessing their planned contribution to agribusiness development in future. They should develop new workable strategies that invest in people (human capital) and support only those strategies that intermediate with non-governmental organizations working with micro-enterprise owners and operators in the agribusiness sector.

VI. CONCLUSION

189. This final section of the report contains summaries of key issues already discussed in detail in the body of Sections 2 through 4, and recommendations (on projects and strategies) that USAID could use to assist the Government of Nigeria in the transfer of agricultural and post-harvest technologies. These summaries are presented in eight subsections as follows:

- Impediments to technology development and transfer;
- Measures and/or investment opportunities for enhancing the development and transfer of targeted agricultural technologies;
- Impediments to micro-enterprise development;
- Impediments to agribusiness development;
- Strategic options for enhancing the role of agribusiness in Nigeria;
- Opportunities for greater private sector involvement in Nigeria's agribusiness growth and development;
- Agricultural/agribusiness investment options for USAID (Nigeria); and
- Proposed viable projects for testing the above investment options.

They are taken in turn and discussed below.

A. Summary of impediments to technology development and transfer in Nigeria

190. Earlier discussions presented in various sections above have identified certain factors as constituting impediments to agricultural technology development and transfer in Nigeria. These impediments may be grouped under five major areas, namely:

- Policy impediments;
- Institutional impediments;
- Technical impediments;
- Economic and/or financial impediments; and
- Social and political impediments.

191. *Policy impediments* include those related to:

- i. Inadequacy, inconsistency, and instability of existing policies on technology development and transfer;
- ii. Ineffective implementation, non-enforcement, and poor coordination of the few existing policies;
- iii. Poor knowledge of existing policies by the intended beneficiaries; and
- iv. Deliberate thwarting of well-intended policies by implementing technocrats.

192. *Institutional impediments* include those of:

- i. Inadequate availability of necessary infrastructure such as electricity, water, telecommunications and transportation, crop storage bins/silos, and processing facilities in the rural farming communities;
- ii. Poor equipping of existing agricultural agencies for technology delivery;
- iii. Instability in the staffing and funding of agricultural research institutions;
- iv. The continuing untidy and ineffectual and inefficacious relationship existing between international agricultural research centers in the country and their national counterparts, NARS;
- v. Poor market development, especially in relation to inadequate organization and handling of technology commercialization; and
- vi. Inadequate/insufficient financial and political support and coordination of private-sector engineering agencies and institutions that fabricate and commercialize post-harvest agribusiness equipment.

193. *Technical impediments* include:

- i. The generally ineffective technology development strategy in the country which slows down technology diffusion/dissemination and prevents the sector from keeping pace with global trends;
- ii. Inefficient production system organization;
- iii. Low factor input and output productivity;
- iv. Non-sustainability of most of the technologies by farmers because of either the cost of maintenance or the deliberate inclusion of perpetual dependence on the technology developers; and
- v. Non-availability of a critical mass of agribusiness *technical* experts to service the technical component of the agriculture sector.

194. *Economic and/or financial impediments* include:

- i. Insufficient public- and private-sector funding of technology development and transfer;
- ii. Poor price and non-price competitiveness;
- iii. High cost of final packaged technologies meant for adoption by poor farmers; and
- iv. Consistent poor pattern of resource allocation and natural resource use by government that consequently increases inefficiency and non-competitiveness in the technology sector.

195. *Social and political impediments* include:

- i. Poor agricultural extension services coupled with inadequate human capacity development of extension staff who service the agriculture sector;
- ii. Use of a set of technocratic advisers who continually encourage state leaders to develop and adopt new policies and program objectives while ignoring those of their predecessors;
- iii. Diminishing emphasis on a good work ethic among Nigeria's farm labor because of relatively low pay and comparatively poor reward system in the agriculture sector;
- iv. Poor information dissemination which itself is caused by poor funding, poor extension, poor telecommunications infrastructure, high level of illiteracy among the farmers, and non-organized support for farmers by the media; and
- v. Unnecessary politicization of technology development in the country.

B. Strategic options for enhancing technology development and transfer

196. As has been indicated earlier, measures that can be proposed for enhancing targeted agricultural technology development and transfer include the following:

- i. Increased private-sector participation in the effective multiplication and dissemination of already existing and acceptable production technologies to farmers at reasonable and competitive prices;
- ii. Establishment and operation of effective and functional private-sector micro-credit/finance organizations that target farmers with the aim of ensuring increased and sustained accessibility to improved technology for production, processing, storage and marketing;
- iii. Formulation and systematic adoption of an agricultural technology development agenda by a competent team of Nigerian agricultural scientists working closely

- with government policy makers/implementers to create new roles for NARS participants;
- iv. Sustained investment in agro-industrial processing enterprises and marketing arrangements that support farmer organizations;
 - v. Support for local private-sector fabrication of necessary processing machines, tools and equipment for the agro-industry that will absorb the increased output flowing from the adoption and use of available improved production technologies; and
 - vi. Support for an increased technology-extension role by agricultural technology developers like the International Institute of Tropical Agriculture (IITA) and the International Livestock Research Institute (ILRI).

197. *A systematic and effective implementation of the first recommendation* (on increased private-sector participation in the multiplication and dissemination of acceptable technologies) should involve the following investment activities:

- *First*, the selection of six improved food crop technologies (cassava, maize, rice, cow-pea, groundnut, and millet) by USAID for increased multiplication and dissemination - such that a crop represents one of the six geopolitical zones of the country;
- *Second*, the selection by USAID (or its appointed contractor) of five productive local governments in each geopolitical zone in which two large and far-separated *community-based farms* could be established in each selected local government for a supervised multiplication of the specified crop technology; and
- *Third*, the provision of US\$10,000.00-grants to each of the two selected communities per LGA for the multiplication of specified technologies.

198. *With respect to the second and fourth recommendations*, USAID could provide recoverable loan funds of US\$50,000 to each of six identified and creditworthy micro-finance farmer organizations or institutions (MFIs) in the country – again, selected on geopolitical-zone basis. Such loans could be supervised by appointed USAID contractors and made payable by the awarded NGO/MFI within five years. The federal government of Nigeria should provide a matching loanable fund to the same selected NGOs/MFIs to support the sustained investment in the agro-industrial processing and marketing activities of the farmer members of these organizations.

199. *Recommendation (iii)* is a task that the federal government of Nigeria should be given to ensure its implementation by organizing a national workshop in which the requested scientists could be representatively selected. This process will be preferable to direct government appointment and imposition of an arbitrary team of scientists to fulfill the recommendation. Such a team must have among the likely agriculturists to be selected, an agricultural economist and a sociologist.

200. *Recommendation (v)* is a task and a challenge for the apex organization of agriculture-sector stakeholders, NACEMA, together with the Manufacturers Association of Nigeria (MAN) to accomplish. They should be specifically mandated to ensure that necessary processing machines, tools and equipment are fabricated for the agro-industry in preparation for the absorption of the increased output flowing from the adoption and use of available improved technologies.

201. *Recommendation (vi)* can be effectively implemented by USAID having IITA and ILRI work with some appointed technology-dissemination contractor(s) who has/(have)

reputable international experience that will facilitate the uptake of those crop germplasms or tissue culture selected for the six geopolitical zones. IITA/ILRI and the appointed international (preferably American) contractor(s) should then be able to work with the community-based farmers in multiplying and disseminating the selected crop/livestock technologies.

C. Summary of impediments to micro-enterprise development in Nigeria

202. As with the case of technology development and transfer, impediments to micro-enterprise development in Nigeria may be summarized here under:

- Policy disincentives;
- Institutional and market infrastructure constraints;
- Technical impediments that border on the quality of technologies available to micro-enterprises; and
- Operational constraints that are defined by the type, scope, and efficiency of support services in the sub-sector.

Sections 3.4-3.6 discuss in detail the various imperfections that critically impact on Nigeria's micro-enterprise sub-sector.

203. *The policy disincentives* have principally centered on the negative impacts of some of government's deliberate past actions with respect to fiscal, monetary, income, tax, foreign exchange and trade, credit, and infrastructure development policies in the periods 1960-1985 and 1986-1998. These negative impacts have included:

- The indirect encouragement of the private companies to engage in the buying and selling of industrial raw materials and final goods produced outside the country as against the desirable promotion of home-grown raw materials and home-made manufacture;
- The accumulation of unbelievable international debts that are, up till today, crippling national efforts at focusing on the development of essential infrastructure and improving Nigeria's international trade competitiveness;
- The economic embarrassment and political shame in which Nigeria has found itself as a beggarly nation before international creditors;
- The consequent general fraudulent attitude now embedded in the country's civil servants and politicians; and
- The general fall in the national psyche that affects the citizens' productivity.

204. *The institutional impediments and market infrastructure constraints* include:

- Market fragmentation;
- Scarcity of collateral by micro-enterprise owners;
- Poor information availability and dissemination;
- Underdeveloped property rights of micro-enterprise operators;
- Poor and often rudimentary infrastructure;
- Poor to non-existent SME law-enforcement system;
- Low-level literacy of the entrepreneurs; and the consequent
- Covariate risk.

The consequences of these impediments have been the artificial creation of behavioral, educational, infrastructural, legal, occupational, role, social and cultural barriers against the majority of operators of micro-enterprises, namely: women and the ordinary poor man in society.

205. *Technical impediments on micro-enterprises* include:

- The absence (among the existing 20 national research centers) of a research institute or center in the country that specifically focuses on the problems and development strategies of micro-enterprises as obtains in developed countries like the USA;
- The treatment of micro-enterprises of micro-enterprises as informal entities that do not deserve any organized technical assistance and programmed technological support; and
- The non-refinement and non-harnessing of the technical expertise of the many self-trained road-side mechanics and engine-repair men that are in the country through organized and systematic training to support down-stream micro-enterprise development.

206. *Operational impediments on micro-enterprises* include:

- The poor level of efficiency of support services in the sub-sector.
- The socio-cultural origin and deep-rooted attitudinal bias against women who happen to form the majority of micro-enterprise establishments;
- The fact that most managerial and marketing functions of micro-enterprises are embryonic and not differentiated so that the owner/operator performs all the functions;
- The fact that the economic activities of these micro-enterprises are often undertaken in addition to other household activities so that not much attention is dedicated the micro-enterprise operations; and
- The fact that the level of credit access tends to make micro-enterprises concentrate in the least-rewarding sectors of the economy.

D. Strategic options for enhancing micro-enterprise development in Nigeria

207. Micro-enterprise performance and contribution to the nation's agriculture sector can be greatly enhanced by the following actions:

- i. The provision of increased credit through NGOs or micro-finance institutes and farmer organizations as a perpetual financial intermediary network by:
 - Developing financial institutions that work for the majority of micro-enterprises;
 - Encouraging autonomous retail micro-finance institutions at grassroots;
 - Liberalizing interest rates to cover costs of small loans and stimulate savings;
 - Introducing flexible regulations that encourage different micro-finance institutions to serve different niches;
 - Making changes in banks' organization, systems, and products that will reduce costs and risks of lending to the large and growing micro-enterprise client group;
 - Establishing bank-NGO-client credit lines;
- ii. The training of officials in many public departments, banks and other lending institutions that have anything to do with micro-enterprise development;
- iii. The building of networks that will ensure appropriate co-ordination between all relevant government and non-government departments and institutions in the field of micro-enterprise and business promotion and development (credit, technical and managerial training, choice of technology, input procurement, legal counseling, marketing, and management);
- iv. The conducting of household or ad-hoc surveys through which the collection of detailed information and data on the many aspects of micro-enterprise existence and development in the country can be strengthened. The elements of this survey should include:
 - The distribution of the enterprises;
 - The gender participation in micro-enterprises;

- The nature and extent of such participation (especially by women) as owners and managers of these businesses;
 - The entrepreneurs' motivations, constraints, strong points, individual strategies, time allocation, and stratification;
 - The linkages between the various categories of micro-enterprises and the rest of the private sector; and
 - The effectiveness and efficiency of existing assistance and support mechanisms;
- v. The building of sustainable institutions that will operate the micro-enterprise sub-sector; and
 - vi. The provision of logistic, technical, and financial assistance by USAID/N to enable the Government of Nigeria implement the establishment of the above suggested network and conduction of the suggested survey - given their potential impact on micro-enterprise and agricultural development and productivity.

E. Summary of impediments to agribusiness development in Nigeria

208. Impediments that hamper the development of agribusiness in Nigeria are, in most instances, similar to those that plague micro-enterprises. They may be classified under policy, institutional, and technical impediments but are summarized here as follows:

- The non-articulation of specific national and regional policies that should direct agribusiness growth and development;
- The underdevelopment of local, regional and global markets for Nigeria's agribusiness products although there is substantial potential demand for them in each market;
- The insufficiency and inadequacy of existing processing facilities in the sub-sector to add value to agribusiness output before export or domestic consumption;
- Poor capacity building in such relevant areas of the sub-sector as post-harvest infrastructure and human technical ability;
- Ineffective and inefficient finance-sector support to the sub-sector;
- Unattractive incentives and non-conducive investment climate to bring commercial-operation level entrepreneurs to the sub-sector;
- Inadequate basic infrastructure (roads, electricity, water, micro-finance network, telecommunications, etc.) that greatly hamper development in the sub-sector and make it non-competitive;
- Poor service linkages between the sub-sector and the finance, technology fabrication, and export sectors of the economy; and
- Low resource productivity in the system.

Details of these impediments are fully discussed in Sections 4.2 and 4.3 above.

F. Strategic options for enhancing agribusiness development in Nigeria

209. The following programs are suggested for enhancing agribusiness development in Nigeria:

- The provision of increased credit through micro-finance institutions or NGOs;
- The training of officials in many public departments, banks, and other lending institutions that have anything to do with agribusiness development so that they can recognize the economic potential of all agribusiness entrepreneurs;
- The setting up of technical and administrative training for improving productivity of agribusiness staff and managers and the quality of the sub-sector's output;
- The building up of networks that will ensure appropriate coordination between all government and non-government department and institutions in the field of agribusiness promotion and development;

- The facilitation of more women's involvement in agribusiness operations through the organization and funding of various supporting social activities such as child care and group discussions to develop better social awareness of women's economic roles in society;
- The provision of marketing assistance to all organized groups of agribusiness operators;
- The establishment of women's groups including an early start to improve girls' access to education and training in modern technical skills as well as in leadership;
- The setting up of new agribusiness enterprises where there are none, or the upgrading of existing ones to meet present-day demands; and
- The establishment of an agribusiness industrial park in each of the six geopolitical zones in the country to promote agricultural-industry inputs and commercial crops.

G. Opportunities for greater private-sector involvement in Nigeria's agribusiness development

210. The future success and development direction in Nigeria's agribusiness sub-sector depends largely on a more serious involvement of the country's private sector. Rewarding opportunities exist for private investors in the areas of:

- ✓ Commodity market identification and development for Nigeria's raw, processed and semi-processed agricultural produce within the ECOWAS sub-region, the European Union, and South East Asia;
- ✓ Organized processing (including fortification) of agricultural commodities and foods for both domestic consumption and exporting;
- ✓ Fabrication and commercialization of simple and inexpensive agro-processing equipment that have already been designed by engineering departments in some of Nigerian universities for use in both rural and urban areas; and
- ✓ Improved crop-technology multiplication and commercialization by more private-sector investors for more effective and competitive dissemination.

211. One of the greatest shortcomings that have always been observed in the agriculture sector development of this country is the neglect of market development for produced commodities. Entrepreneurs in the sector always take the marketing of their produce for granted whenever they plan investing in agriculture. They go straight into large commercial production assuming that the market is there and ready to absorb whatever they produce. This, of course, has always ended in great disappointments for the investor thereby discouraging future investment in the sector.

212. Future plans by private-sector investors in the development and expansion of Nigeria's agribusiness sub-sector must, of necessity, therefore include the identification and development of markets both locally and abroad for the targeted crops or products. The Cross River State of Nigeria has taken the lead in this direction by identifying and targeting specific markets at home and abroad for certain local crops in which it has comparative production advantage. The State has, for example, identified reliable export markets in Europe and South-east Asia for the exportation of semi-processed cassava chips/pellets/starch, while domestic ones have been found for processed pineapple chunks and juice starting from the first quarter of 2001. The identification of these markets has accordingly informed the State's planned programs of production of these crops. The State government's initial involvement and input in these projects is explained to be temporary. The entire program is intended to be a private-sector initiative in which government's role is planned to be the provision of an enabling and supportive policy environment and the provision. Government's total involvement at this stage is to prove

to risk-averse private investors in the State that the program is a profitable venture that will not only create employment opportunities for the rural dwellers but also generate increased income for farmers in the State.

213. For the three remaining intervention areas suggested above, individual investors need not undertake such increased private-sector investments alone. They are areas that could be jointly invested in by groups of entrepreneurs in the state – partly because of the amount of initial capital that will be required, and partly because of the operational logistics that will be involved. At an era when there is an urgent need to develop alternative means of earning foreign exchange, plans to process and export non-traditional agricultural products are definitely an action in the right direction that needs support by donor/funding agencies. USAID/Nigeria may wish to encourage private-sector investors that show interest in this endeavor.

H. Agricultural and agribusiness investment options in Nigeria for USAID/N

214. As indicated in various sections above, the USAID Mission in Nigeria can play a crucial backstopping investment role in the following areas of the country's agriculture and agribusiness development efforts:

- The multiplication and commercialization of selected currently available improved seed and livestock technologies through community-based farms and/or private-sector companies;
- The provision of financial support to crop-specified farmers in form of timed recoverable loans to private-sector ventures through carefully selected MFIs/NGOs that are ready to undertake and administer investments in the development of agro-industrial processing equipment and facilities;
- The provision of small (US\$5,000.00) grants to five farmers who meet some specified criteria selected from each of the 36 states of the federation; and
- The production of a well-articulated agricultural policy document that will incorporate a detailed section on a planned agribusiness development strategy for the country for the next five years.

I. Proposed viable projects for testing the above investment options

215. For the suggested investment options indicated in Section 5.8, the USAID/N Mission can decide to undertake the support of the following specific viable projects.

- i. *The Cross River State Rural Community-based Poverty Alleviation Project* This project is currently adjudged the best-articulated and already-on-the-ground statewide poverty alleviation program in the country. According to the aim of this project, target communities in the state with proven agricultural resource bases and farmer determinations are selected for a planned promotion of three key crops: cassava, pineapple, and castor. The objectives of these three crop projects in the State are to expand the production and processing/semi-processing of the selected crops. The facilities for the processing or semi-processing of these crops will be located in model community centers that are being developed with other complementary basic infrastructure to support the entire program. As a complementary component, government encourages private-sector investors to establish individual crop processing units at the village level throughout the State to provide synergistic support to these model communities centers. Furthermore, private-sector transportation businesses are encouraged to invest in the timely collection and delivery of both the raw materials (from farms to processing points

in the villages) and processed output from villages and community centers to the Calabar port.

This entire arrangement in Cross River State provides a ready-made investment project that USAID/N can support and/or buy into for immediate visible impact without the headache of starting a completely new investment effort. By promoting and supporting the private-entrepreneur-involved components of commercial village-level crop processing facilities and transportation of these goods to the collection points and the Calabar port, USAID can quickly parcel this entire project into a model success-story that can be “sold” to other states for implementation at their own cost.

ii. *A small-grants project for enterprising farmers*

USAID can establish a small-grants pilot project for six enterprising crop/livestock/fishery farmers selected from six states in the federation. Such grants will be for US\$5,000.00 per farmer to support their production, processing and marketing activities for increased income generation within a period of one year. The success of this trial run can then be used to replicate the project as recommended in Sections 5.2 and 5.8 above.

iii. *The Nigerian agricultural policy document project*

After using appropriate consultants to develop a draft agricultural policy document, USAID can fund and organize selected stakeholders’ workshop during which the draft document can be discussed and emanating ideas synthesized to produce a *National Agricultural Policy for Nigeria*.

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