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SUSTAINABILITY IN AGRICULTURE: THE NIGERIAN EXPERIENCE WITH RESEARCH AND EXTENSION SERVICE AGENCIES

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ABSTRACT

This study reviews the prospect of fostering sustainable agrarian growth through the activities of present research and extension service agencies. The analysis shows that very limited achievements stand to their credit in terms of attainment of set targets, capacity building, incentive administration, institutional viability and the relationship of their operations to the performance of the agricultural sector. Among the problems which undermine their efficiency and sustainability are weak human, institutional and management capacity. This is coupled with undue government interference and lack of sustainable funding; propagation of modernisation technologies which tended to undermine traditional systems; and weak interrelationships and interactions between research and extension service efforts and the dominant farming systems. The study concludes by charting a credible course for sustainability of these institutions as well as agrarian growth.

1. Introduction

The need to foster sustainable growth, especially of agriculture has become very paramount given the rapid population growth of many developing countries, rising demand for food and the extent of environmental degradation. This is why the propagation of production systems and methods capable of enhancing productivity through viable institutions and programmes as agents of change is considered desirable. Such institutional programmes and activities are often expected to foster development not only in the desired direction, but must not compromise the welfare of future generations. The concern is with the ability of existing resources and the exploitation rates and strategies to sustain production at levels consistent with population growth and the limits imposed by environmental factors. The consensus in general, is that the resource exploitation systems and strategies adopted by development agents must be such that they not only foster growth, but must be one that do not waste resources and degrade the environment.

Among the prominent agents of change in agriculture are research and extension service institutions, which help to promote the development and adoption of new technologies by farmers. The contention generally in Nigeria is that observed agrarian growth may not be the result of the activities of these institutions. This contention is often justified by noting that spurts of agricultural growth through these institutions have been based on external borrowing, inflationary financing, rapid depletion of natural resources, and degradation of ecological systems. Little wonder therefore that it did not last and the issue of institutional sustainability has in itself become topical.

The objective of this study is to assess the prospect of fostering sustainable agrarian growth through the activities of present research and extension service agencies. In particular, it assesses the performance of these agencies, x-rays the problems which undermine their

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efficiency, examines the prospects for institutional and agrarian sustainability and charts a course for future policy directions. The rest of the paper is divided into four parts. Part 2 discusses the theoretical framework for measuring institutional and agrarian sustainability. Part 3 presents an assessment of the sustainability of Nigeria's research and extension service efforts. Part 4 x-rays the problems and challenges for sustainability of research and extension service efforts, while the final part charts the course to institutional and agrarian sustainability in Nigeria.

2. Theoretical framework for evaluating the sustainability of development programmes

There is the general consensus among policy analysts that if significant progress and growth is to take place, there is the need to make provisions for adequate support of development programmes and systems so as to prolong their usefulness. This gave rise to the term sustainability, which has become very important in assessing agricultural development efforts and their implication for resource conservation and management. According to Brundtland (1987), a development effort is sustainable when "it meets the needs of the present without compromising the ability of future generations to meet their own needs". With regard to agriculture, Jodha (1990) defined sustainability to mean the ability of the agricultural system to maintain a certain well-defined level of performance (e.g. output) over time and to enhance that output without damaging the essential ecological integrity of the system. These definitions are aptly summarised by the FAO (1992), which defines sustainable agricultural and rural development (SARD) as "the management and conservation of the natural resource base, and the orientation of technological and institutional change in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations". Such sustainable development (in the agriculture, forestry and fisheries sectors) conserves land, water, plant and animal genetic resources, and is environmentally non-degrading, technically appropriate, economically viable and socially acceptable.

Measuring and evaluating sustainability of institutions and programmes has been a very difficult task, due to several reasons. Firstly, sustainability is a dynamic concept involving measuring improved performance and efficiency over time which, in most cases, static analysis criteria may be unable to capture. Secondly, such analysis must also take into account the interactions between existing farming system approach and research and extension service propagation as well as the implication for current and future production. Thirdly, the dominant research and extension service approach needs to exhibit the tendency to survive the test of time. Given these conditions, several authors suggest that a partial dynamics model, capable of gauging the extent which the orientation of technological changes and propagation methods influence current and future performance of implementing agencies, may be most appropriate. This requires a determination of performance criteria for implementing agencies. For this first part, many economists tended to use descriptive statistics to relate the activities of these development agencies to sector performance, within a general framework of "with" and "without" the institutions. Patrick (1966) and Graham *et al.*, (1980), concluded that the result provided by such assessment criteria would be inconclusive as it would suffer an from "attribution" problem which stems from the fact that several other factors exist which may explain the differences in "with" and "without" situations. A few other studies have used econometrics methods to analyse the impact of institutionally provided sector incentive schemes on beneficiary behaviour, especially the effect on production practices and the implication for productivity. The assumption is that institutional activities have a dominant influence on all the production parameters, ignoring the influence

of beneficiary response and other factors.

Next is to set criteria for determining whether the agencies as well as the performance of the agricultural sector could be sustained over time. This has often been represented simply through trend analysis and the correlation over time of the performance of the institution vis-à-vis the agricultural sector.

Irrespective of an adopted analytical approach, there is the consensus that there are three key elements or criteria for evaluating institutional sustainability. The first relates to the sustainability of the production system which is propagated by the institution. By this, we mean the technology being introduced to the farmer, which would ultimately affect his "way of doing things" or "method of production". The conclusion in the literature is that propagation of modern production systems is not easily sustainable in an economy characterised by structural dualism, whereby traditional methods exist side by side with modern methods. In a comprehensive study of African agricultural development, De Wilde *et al.* (1967) concluded that "By and large, it has been the individual farmers working within a gradually changing traditional environment who have accounted for most of whatever progress has been achieved", confirming the relative unsustainability of modern technology within the African context. The second relates to the institution itself. The conclusion is that programmes and institutions which build on the strength of traditional institutions are more likely to be sustainable in the long run than those which often attempt to supplant traditional ones. The third relates to the adopted extension service approach. The experience in Africa is that many of the institutions and programmes adopted a didactic approach, which often exhibits a high degree of insensitivity to fundamental rural linkages, inter-relationships and interactions - especially when they involve sociocultural factors.

Drawing largely from these conclusions, the evaluating criteria for measuring the sustainability of research and extension service efforts in Nigeria would include an assessment of Nigeria's research and technological approach and the implication of dualism for sustainability, institutional performance, especially their viability and sustainability over time and, above all, the degree of interaction between the institutional programmes and the activities and cultural practices of the farmers.

3. An assessment of the sustainability of Nigeria's research and extension service efforts

Nigeria's agricultural research and extension service, based on its performance and sustainability over time, can be assessed using three major criteria, viz.: the relative efficiency and sustainability of propagated research, technology and extension services; the performance and sustainability of implementing institutions and, lastly, the implications of propagated farming systems and institutional viability for agrarian growth and sustainability.

3.1 Performance and sustainability of agricultural research and extension service agencies

The performance and sustainability of agricultural research and extension service agencies in Nigeria can be assessed against the backdrop of the desirability and attainment of stated objectives, the implications of their operations for incentives/disincentives to adopt new technologies in farming, institutional viability, sustainability and the relationship to the overall growth process and development. For the purpose of this study, only agricultural research and extension service institutions are examined.

3.1.1 Research agencies

Several public institutions carry out research in Nigeria, especially in the area of promoting agriculture. Many of the research institutes are organised along commodity lines, viz., Cocoa Research Institute of Nigeria (CRIN), Nigerian Institute for Oil Palm Research (NIFOR), Rubber Research Institute, etc. A few are multi-disciplinary, like the International Institute for Tropical Agriculture (IITA), Agricultural and Extension Research and Liaison Services (AERLS), etc.

The performance of these institutions can be gauged mainly through their effort to develop high-yielding and disease resistant varieties of seeds and improved farming systems. Among the remarkable achievements of these institutes are: the development of improved maize varieties, miniset seedlings for yam, a very short tree variety of oil palm and an early maturing variety of cassava.

A comparative analysis of the gross return per hectare production of maize in Nigeria using unimproved and improved small scale technology is a clear example of the effects of improved farming system practices (technologies) on the productivity of farmers. *Chart 1* presents the result of the CBN/NISER (1991) study which showed the relative returns to improved vis-à-vis unimproved technology in 1985 and 1989.

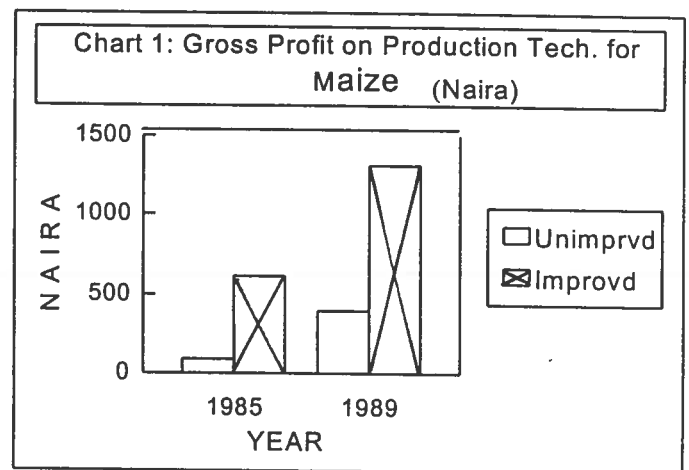


Table 1 also shows that the productivity per hectare of maize production doubled to 1.5 tonnes per hectare for improved technology as against 0.7 tonnes per hectare for the unimproved farming system. The return to labour per man-day stood at N11.05 at a time when it was N1.45 for unimproved technological production systems. The observation, however, is that this break-through has had very limited impact on agricultural production. Average national yield rates and productivity of the farm sector are still very low. For instance, national average maize yields in Nigeria are about one tonne per hectare, as against the world average of 4 tonnes per hectare. Average yield rate of oil palm per hectare is about 8 tonnes as against 25 tonnes per hectare for Malaysia. The inferences that can be drawn from these figures are that the innovative indigenous research results were not adequately diffused to the field and that the rate of adoption has been very low. Several reasons can be adduced for the limited impact of these research findings. Firstly, many of the research outcomes were never commercialised. In particular, most of the high yielding varieties of seeds and improved farming system technologies developed never goes beyond the experimental field. The primary impediment is that most research institutes are statutorily limited to conduct of research alone, while the propagation of new technologies is often done by different extension service agencies. Commercialisation of research findings therefore depends on the derived demand for it by extension service agents, and the willingness of the private sector to mass replicate the inventions. Secondly, extension service in Nigeria has tended to propagate more of the innovations, which often suppress indigenous research outcomes. For instance, agricultural extension service propagates more the use of imported fertiliser, agrochemicals,

machines and equipment, neglecting entirely indigenous farming systems and the wide array of research findings which are available at the research institutes. Thirdly, most incentives to farmers to adopt new technology seemed to be tied to imported rather than indigenous technologies.

An evaluation of the institutional capacity shows that research spending is very low, and unsustainable. As a result of this, these institutes can hardly retain their good staff, lack adequate research facilities and can hardly support current expenditures on overhead. Total spending on these institutions is less than one per cent of the capital expenditures of the Federal Government. Sometimes there is non-release of funds for almost a year thus crippling all activities. Countries that experience rapid technological breakthrough devote a significant proportion of their public investments to Research and Development.

3.1.2 Extension service agencies

Prior to the expansion of Agricultural Development Programmes (ADPs) from enclaves or pilot projects to State-wide agencies, the Federal and State Ministries of Agriculture were the main organs or institutions for publicly provided extension services in agriculture. The World Bank Assisted ADPs have since taken over extension services in agriculture, beginning from the mid-to-late 1980s.

Evidences abound which show that line ministries failed woefully in providing extension services in agriculture. A review of most of the extension programmes shows that adopted extension systems often failed to offer new indigenous techniques but extended foreign technologies without taking account of specific agro-climatic and resource constraints facing the different farm systems or areas. For instance, the emphasis has been on propagating costly fertiliser and labour-saving technologies in land/labour surplus, low-yield areas. The past capital expenditure profile of the Federal Government on agricultural extension service attests to this fact. In 1990, about 50 per cent of annual capital vote was devoted to fertiliser importation and distribution alone. Table 3 shows that allocation to fertiliser accounted for between 27 to 50.3 per cent of agricultural budgets for 1989 to 1994. The rest was often committed to large scale capital intensive irrigation and storage schemes, acquisition of tractors for Hiring Units and the supply of agrochemicals, with a very insignificant amount devoted to supply of improved seedlings. Worse still is the very poor political, managerial and budgetary commitment to the real extension service itself. Most times budgetary crisis kept many extension agents on the pay roll without funds for subsistence and transport to farm sites where their services are needed. Many extension agencies were unable to provide the required rural infrastructure, build technical capacity through training and/or skills improvement and even on the job experience for extension workers, who frequently knew less than farmers about appropriate practices. Most of the agencies failed woefully in their task of promoting agriculture, as they often set aside their primary task of reaching out and eliciting farmers participation, but concentrated more on the input supply and distribution agents.

The ADPs were successful with extension service during the era in which they enjoyed World Bank assistance. Available data show remarkable improvement in productivity per hectare of farmer beneficiaries of ADPs extension services when compared to the national average. For instance the average productivity per hectare for most crops produced by the ADP farmer beneficiaries was much higher than those of the non-beneficiaries and the national average (see Table 2).

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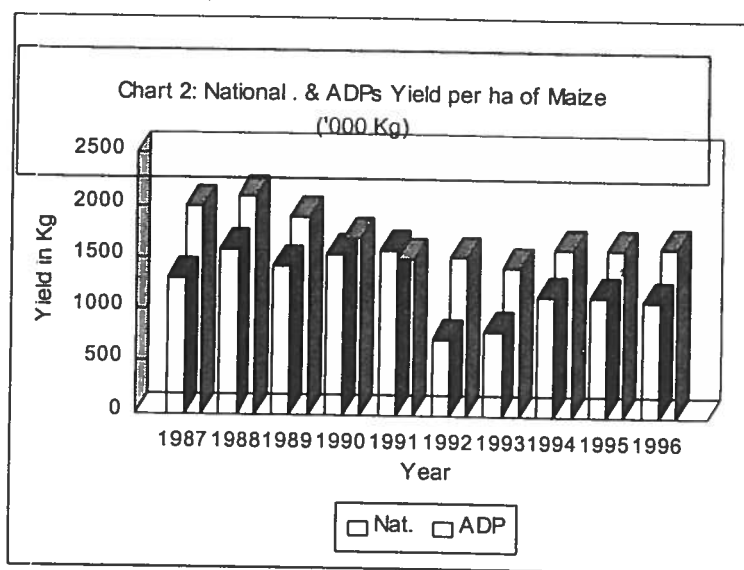
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Chart 2 presents the comparison of productivity per hectare of maize under the ADP system vis-à-vis the national average. The relative success was traceable to improvement in service funding, and the adoption of better extension service approach. The training and visit (T & V) approach to extension which they adopted ensured interaction with farmers. Unlike the single



line command practised by the ministries, whereby agents provided only the specialised services they offered, the ADP approach struck a balance between delivery (focusing on the professionalism of workers who work full time to deliver all services needed by a farmer under one command) and feedback (through regular visits to the farmers, with the extension worker spending a large part of the day in the farmer's field). The records of some ADPs in the late 1980s show that the T & V system

appears to have raised production among the beneficiaries of the programme. Average yields of maize, sorghum and other commodities were higher than the national average. The story is probably different today. The World Bank assistance has dried up, and many of the ADPs currently face serious budgetary crisis, and are unable to sustain the projects. The extension service machinery has broken down in almost all of them.

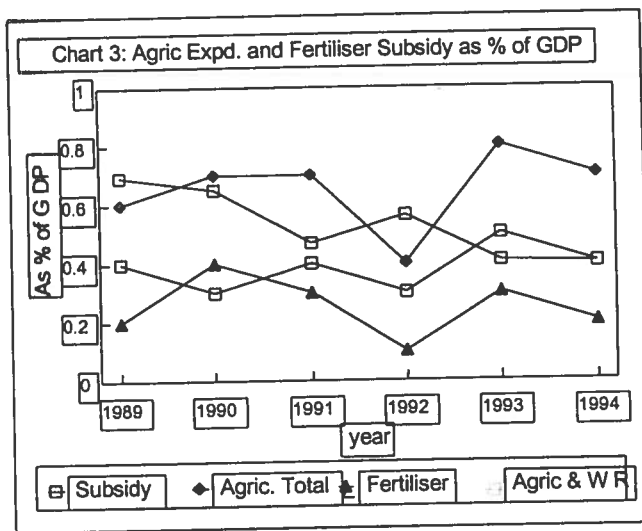
3.2 *Relative efficiency and sustainability of propagated agricultural systems and technologies*

Nigeria's agrarian structure is basically a mixed system of subsistence and modern farming. The gap between the two production systems is immense, with the subsistence agriculture dominating. The Federal Office of Statistics (FOS) estimates show that subsistence farming accounts for 90 per cent of agricultural output, while the modern farming sector accounts for the rest. In general, the subsistence farming is characterised by (i) production for subsistence; (ii) the abundance of land and the practice of shifting cultivation; and (iii) a land tenure system which grants rights of access to each family (both nuclear and extended). The system results in land fragmentation, whereby the farm family can plant only very small areas at a time, using traditional tools and crude implements such as hoes and cutlasses and relying mainly on human labour. Production is highly labour intensive and the demand for labour can be very high at peak periods, particularly during weeding and harvesting. The productivity of the subsistence farming system is low and depends largely on labour availability and the vagaries of weather.

Efforts to transform the subsistence farm sector have focused on the adoption of new technologies, especially the propagation of mechanised modern farming systems. In particular, the emphasis is on propagating the use of modern farm inputs such as tractors, ploughs, sprinkler irrigation, improved high yielding varieties, fertilisers, agrochemicals and pesticides, most of which are imported. Production is highly capital intensive and labour displacing, so that only a very few farmers can engage in modern farming. The current reality of today is that the modern farming sector is in malaise, fostered mainly

by the maintenance or exaggeration of socially "incorrect" signals and incentives, inherent in the adopted structural transformation strategies. Some of the wrong incentive signals include bias in the protection and promotion of modern farms, as against the traditional systems, through investment in the propagation of modern technologies, provision of generous incentives for their adoption, regulations, etc. For instance, a wide range of internal and external pricing policies was used to foster and protect large-scale farming for a long time in Nigeria. This included subsidies and special tax concessions to modern sector investors, overvalued exchange rates and foreign exchange allocations designed to lower the cost of importing capital and intermediate goods, subsidised interest rates and credit rationing, together with a whole array of bureaucratic formal institutional and licensing arrangements.

An evaluation of the performance record of agencies involved with the propagation of the modern farming systems showed that they failed to contribute meaningfully to sustained agrarian growth and development for several reasons. Firstly, they relied mainly on public funds for their survival. The Fertiliser Procurement and Distribution Department (FPDD) responsible for procuring and marketing fertiliser expended between 27 to 50 per cent annually of the total capital budget for agriculture, while the subsidies amounted to between N1.6 billion in 1989 to as high as N3.7 billion in 1994 (see Table 3). These subsidies amounted to very significant transfer payments intended for the beneficiaries, which in most cases ended up in wrong hands. *Chart 3* shows the trends in budgetary spending on the



fertiliser subsidy vis-à-vis other essential vote heads as a proportion of GDP. The observation generally is that fertiliser distribution and subsidisation policies administered by the public sector monopoly have not reduced the gap between supply and demand, nor have they resulted in lower prices for most farmers. Instead, their marketing strategies placed heavy pressure on the federal and state budgets and caused major inefficiencies in resource allocation. The fertiliser procurement and distribution also suffered from the setbacks: there were widespread

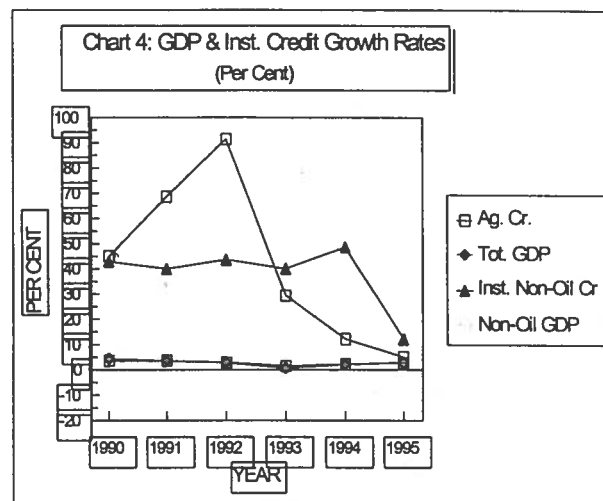
reports of diversion, smuggling across the border, and failure to reach the farmers for whom they were intended.

Interestingly, however, the traditional system has exhibited some vibrancy and ability to sustain itself year in, year out. The vibrancy of the traditional system despite attempts to "supplant" it is rooted in the historical traditions and current realities of today. The strengths of the traditional farming system lie in the constructive use of indigenous values, cultures and institutions in very many ways for subsistence over a long period of time. For instance, the informal credit system which draws on customary values and patterns of social organisations have remained successful, while many indigenous cultivation practices, such as bush fallow, alley and mixed farming have some technical merits.

3.3 Institutional viability, propagated farming system and sustainable agrarian growth

An attempt to relate the institutional trends and propagated farming systems to the growth in agricultural output in Nigeria reveals quite interesting statistics. The analysis shows that both the research and extension service agencies and the propagated farming systems have been relatively ineffective in stimulating agricultural growth. For instance, years of significant concentration and expenditures on the promotion of some key modern inputs such as fertiliser, irrigation development

and even expanded credit to the agricultural sectors, culminated in the period when both national and sector economic growths were on the decline. *Chart 4* shows the trends in aggregate economic and agricultural sector growth vis-à-vis the growth rates in aggregate real investment on fertiliser, total agricultural spending, irrigation expenditures etc. Indeed, Table 4 confirms that there is no significant relationship between aggregate and sector economic growth and the emphasis on the supply of modern inputs as well as credit and agriculture expenditures. So many reasons can be adduced for this development. Firstly, there are issues relating to beneficiary cultural practices and behaviour, which include failure to adopt production techniques, low yields and funds diversion to uses other than these intended. Secondly, there are factors emanating from the propagating agencies themselves, which include weak capacity for service delivery, failure to adapt propagated practices and behaviour to farmers' needs and convenience, etc. Thirdly, there are issues revolving around government policies, which include the failure of subsidy policies to inspire the farmers to adopt new technologies, political interference in the management of research and extension service agencies, frequent changes in policy and, above all, unsustainable funding.



4. Challenges and prospects for sustainability of research and extension service

The challenges confronting most of the research and extension service agencies in Nigeria with regard to their performance and sustainability over time are myriad. These can be classified into three types, viz.: those problems relating to the institutions; those relating to the nature of research and extension services propagated; and finally, environmental and social factors which inhibit the degree of interaction and interrelationship between research and extension and agrarian growth.

4.1 Institutional problems and challenges

The institutional problems and challenges to agricultural research and extension service in Nigeria include weak human and institutional capacities, defects in policy approach, a dearth of domestic economic management capacities and undue government interference, as well as a weak prospect for sustainable funding. Weak human and institutional capacities were often

reflected mainly by the wide gap between targets and attainments in terms of the competence of managers, dexterity and resourcefulness of technical staff, and the astuteness and transparency of accounting personnel. Also, many of the institutions have great difficulties in recruiting and retaining qualified staff as a result of poor labour and financial policies. Many such policies may be external to the institution, such as limits on the hiring of skilled personnel, either in response to budgetary constraints, or as the result of the desire to foster equal ethnic or regional representation. Others may be internal to the institution itself, such as weak pay incentives, under-funding of operational costs and management abuses in the form of funds embezzlement and diversion.

At their inception, most of the agricultural research and extension service agencies depended heavily on external agencies and consultants for their design, project implementation and evaluation. Indeed, most institutions and their reform programmes were designed principally to attract external support. In particular, the Agricultural Development Programmes and the international research centres such as IITA were designed to attract World Bank and other multilateral agencies' funding. This stimulated the demand for policy analysis, which is often provided by the external agencies. Most often because either the precondition for access to the facilities excludes the use of local experts, or there is a dearth of sufficient local capacities to meet this need. The institutions, which benefited from foreign expertise advice, have a record of good performance while the consultants were around but suffered serious setbacks when they left. The downturn in the performance of the ADPs is a case in point.

Related to the above is the issue of duplication of research and extension service efforts. The observation in Nigeria is that there are too many public agencies involved in agricultural research and extension service, thereby competing for the same public funds. This often results in resources being spread thinly and being insufficient to foster institutional viability. Most of the research institutions and extension service agencies suffer from this setback.

Other institutional problems are the tendency of the institutes to suppress private sector initiatives. For instance, the supply of modern inputs to farmers such as fertilisers, irrigation water and tractor hiring services were monopolised by government agencies and supported through huge subsidies, principally to suppress private sector initiatives. Little wonder therefore, that most of these research outcomes have been difficult to commercialise or that competing imported technologies are often promoted, as the private sector finds imports more lucrative.

Another problem is that of undue government interference in the day-to-day operations of research and extension service agencies, which has had adverse consequences on their performance. Most common are frequent changes in management teams, uncontrolled expansion of staff, induced by government desire for the agencies to function as welfare programmes for the unemployed. Also encountered are pursuits of a policy of equal representation based on ethnicity or regional criteria and insufficient appreciation in government that public agencies work best if staffed and run by professionals, according to objective rules and criteria. In recent times, insistence that most of the institutions must operate within the civil service pay structure, rules and regulations have also been encountered. Above all, there is the problem of lack of continuity. Many extension service agencies are either proscribed as the government changes or replaced with new ones. The projects and business conducted by the previous institution are most often abandoned with significant sunk costs thus being forgone.

4.2 *The nature of research and extension services propagated*

The greatest challenge to sustainable research and extension service in Nigeria today is how to overcome the inherent conflicts in the adopted development strategy which resulted in the emergence of structural dualism. The question is often asked: how do you narrow the gap between traditional and modern farming systems? Especially when given the tendency that "superior" and "inferior" systems will continue to exist side by side permanently, and considering that the degree of divergence tends to increase over time and that they are mutually exclusive, without any serious interrelations between them? The answer to this question is not easy to come by. Perhaps an attempt to x-ray the problems and conditions which lead to this situation may give us a clue.

The main problem is the posture of policy, which believes that traditional systems will have to give way to modern ones in their effort to promote growth and development. As can be deduced from the analysis so far, the stance adopted by the post-independence strategies that "Western" or modern systems represented "progress" and that traditional systems must be discarded, is not supported by the realities of today. Certainly, we agree that rapid growth and higher productivity can be fostered by the adoption of modern techniques, machines and tools, and that when affordable and available these are preferred to the traditional methods. The concern, however, is with the slow pace of internalisation of this process of change which has no root in the country's social and economic context. It is therefore not surprising that the traditional farming systems are still as vibrant as ever today.

Related to this is the failure of adopted strategies to extend erstwhile incentives to the traditional farming systems, as they have been to the modern ones. The total neglect of traditional farming systems, as well as the failure of policy to attempt to recognise their strengths, while exaggerating their weakness, represents a serious impediment to their transformation process.

Another problem is the scarcity of intermediate technologies capable of bridging the gap in the dualistic character of agricultural production systems in Nigeria. As has been mentioned earlier on, the Nigerian agriculture is characterised by countless number of small farm holders and a few medium-size to large farms but not much in between. Modernisation inputs and services are all for a few medium to large farms, and nothing for the small holders. This is a reflection of the defects of adopted modernisation strategies which only made provision for a sharp switch from traditional methods to capital intensive modern ones. For instance, when farmers modernise, they switch from an inexpensive hoe to a very expensive tractor, as well as having to change their crop husbandry methods and management. There is no middle course and/or transitional state, thereby putting the farmer in a state of dilemma. These are the many factors, which have tended to undermine the efficiency of propagated research and extension service systems in Nigeria.

4.3 *Degree of interrelationship and interactions between institutions, farming systems and agricultural growth*

The experience so far has shown that farmers have a holistic approach to any problem related to their enterprises. For instance, farmers and their families instinctively operate in a way that is both inter-disciplinary and multi-sectorial - this is simply a reflection of what they must do to obtain their livelihood. Farmers have family, social and civic responsibilities. They must practice a wide range of skills within the community and household. Additional skills are needed to generate non-farm and off-farm income. As farmers, they must be familiar with both crop and animal husbandry and be competent in marketing, storing of produce and

treatment of pests and diseases. They must manage hired labour, decide on land allocation, arrange credit, weigh likely profit against risk, and perform dozens of other categories of task in the course of the farming year.

However, the integrated nature of rural life is seldom reflected within research and extension service agencies. These generally focus on a single commodity or similar ones which could be located and/or dispersed between several different ministries and parastatal agencies. Most are staffed by specialists trained to work on single components or sub-components of the agricultural process, and educated to think in a "reductionism", scientific manner rather than a holistic, informal manner. Most often, only a few of these specialists will have any degree of sensitivity to fundamental rural linkages, inter-relationships and interactions - especially when they involve sociocultural factors. Their training and experience conditions them to remain strictly within their discipline and to adopt a didactic approach - passing limited messages, or technical advice "packages" to an essentially passive clientele. They are seldom taught how to listen to farmers' opinions, and rarely attempt to understand their perceptions, or to learn from the store of knowledge accumulated within the community over generations. Most development workers - and certainly most policy analysts - have extremely limited contacts with anyone in the community of small holders, apart from family connections.

5. Towards sustainable research and extension service and agricultural growth in Nigeria

For research and extension service agencies to contribute meaningfully to sustainable agrarian growth, they need to address the problems of institutional weakness, review the modernisation and technological propagation strategies and, above all, restructure their operations to meet the needs of an integrated farming system approach.

5.1 Institutional restructuring

The objective of institutional restructuring would be to streamline their activities in order to strengthen their performance and effectiveness. In particular there is the need to review the current didactic approach of most of the research and extension service agencies to incorporate a holistic farming systems perspective into their work plan. In practice, it is realised that a holistic concept, incorporating a high degree of people's participation, is not easily adopted and applied by sub-sector ministries and single-function research and extension service agencies staffed by professionals with a narrow, didactic approach. However, given the enormity of the problems and the current financial resource constraints, radical changes are required in order to do this. This calls for a new direction in institutionalisation, which may include a major restructuring of the institutions involved.

The above conclusion may be too idealistic and probably infeasible in the vast majority of situations. For both practical and political reasons, established institutions are extremely resistant to changes that involve shifts in power and responsibilities. It may be very difficult to evolve an institution that is multi-sectorial and multi-disciplinary to cover all aspects of research and extension service without duplicating the functions of existing line ministries and agencies. A less radical approach may be to create a co-ordinating cell or unit, drawing on resources from line institutions and ministries. This has its drawbacks, as it can sometimes amount to the creation of another irrelevant, under-funded service at the periphery of the institutional mainstream.

5.2 *Promotion of integrated systems approach to agricultural research and extension*

Given the enormity of the problems often encountered with restructuring programmes, an alternative approach may be to foster the use of an integrated inter-disciplinary approach, which transcends line ministries and accommodates community participation. This calls for the establishment of a co-ordinating secretariat from among a strong ministry, the decentralisation of administrative process, and adjustments to existing institutional arrangements, rather than their complete transformation. The co-ordination mechanism could involve frequent meetings of senior representatives from all the relevant ministries and institutions. Day to day holistic analysis will, however, almost certainly require the secondment of specialists between ministries and institutions, (e.g., a livestock husbandry specialist to a Crops Ministry). The approach will also necessitate the recruitment of specialists in new disciplines, such as sociology and economics, into traditionally technical and scientific strongholds. In order to elicit community participation, there would be the need for a complete change in skills and attitudes on the part of institutional staff. The requisite sensitisation, re-orientation, and education will have to be organised on a vast scale. It can initially focus on extension or research services, or by introducing holistic systems criteria into the project appraisal mechanisms of the institution concerned. This approach is a "soft" adjustment - incremental initiatives that do not involve radical restructuring of institutions to begin the process of institutionalisation. Among the programmes and action necessary for the "soft" institutionalisation of development efforts are education and training which imparts skills and re-orientates workers; specification of operations and procedures through design of work manuals, establishing appropriate project appraisal criteria, adjustment of budget allocation procedures, and strengthening monitoring and evaluation units. This will also entail staff adjustments through secondments and recruitment of staff, as well as the engagement of consultants, co-operation with NGOs and farmers' organisations, and co-operation among the institutions themselves. Above all, there would be the need for networking, to facilitate co-ordinating through regular inter-ministry meetings, common databases, inter agency task forces and linkages with international networks.

5.3 *Complementary policy initiatives*

A complementary step towards desirable institutional changes is to foster a conducive enabling environment. In particular, it is a matter of utmost importance for the state to establish a predictable and honest administration of the regulatory framework, to assure law and order, and to foster a stable, objective, and transparent judicial system. In addition, it should provide reliable and efficient infrastructure and social and information service - all preconditions for the efficiency of productive enterprises, whether private or state-owned.

A critical review of the operation of existing institutions would need to be done. As much as possible, research and extension service institutions could be merged, streamlined and rationalised to retain just a few. This could improve the funding situation considerably. The performance of the retained institutions can be strengthened through realignment of duties and rationalisation of responsibilities. This entails the need to eliminate current duplications of responsibilities, and synchronisation and co-ordinating of institutional efforts so as to become complementary. Experience shows that public institutional arrangements for stimulating non-oil exports are more likely to succeed when implementing agencies are given clear and attainable objectives, day-to-day managerial autonomy, and unambiguous performance indicators, which permit the supervisory body to monitor progress without undue interference.

Above all, there is the need for sustainability. This calls for proper nurturing of performing

institutions through adequate funding and capacity building. Performing institutions should not be allowed to decay as their initiators move on. Any problem observed should be addressed with dispatch. Emphasis should be on capacity building through a new drive for human resource development, especially a radical reorientation of education and training to improve quality, relevance, and cost-effectiveness and through the adoption of innovations.

5.4 *Concluding remarks*

In conclusion, it should be noted that sustainable agricultural growth could only take place through viable and sustainable research and extension service agencies. Attention should therefore be given to adequate capacity building through a new drive for human resource development, especially a radical reorientation of education and training to improve quality, relevance, and cost-effectiveness. It also calls for the adoption of a systematic approach to strengthening research and extension service efforts, by paring down overblown public agencies, directing their activities away from controlling and towards promoting development and fostering co-operation and collaboration with non-governmental intermediate and grassroots organisation. Above all sustainable funding, as well as commitment of the government to implementation of reforms, is a prerequisite for an appropriate institutionalisation process for fostering sustainable agricultural growth.

Another major conclusion is the need to refocus structural transformation efforts towards bridging the gap between traditional and modern systems. In particular, efforts should be geared towards promoting only those modern methods which support the traditional sector, rather than those that aim to replace it. Nonetheless, the traditional sector, despite its strengths, should not be romanticised. On the contrary, the aim must indeed be change, but change that is securely rooted in the country's economic and social context. What is advocated is structural changes through technologies with a 'human' face.

Finally, the social and cultural context would need to be created within which to foster desirable interactions and interrelationship between farming system and institutional approaches, as well as the responsiveness of the farmers.

TABLE 1: COMPARATIVE RETURNS FOR IMPROVED vs UNIMPROVED SMALL SCALE MAIZE PRODUCTION TECHNOLOGIES

	1985		1989	
	Unimproved	Improved	Unimproved	Improved
OUTPUT (Value in Naira)				
Yield (kg)	525	1125	1050	2250
Unit Price (=N=/kg)	700	1500	700	1500
	0.75	0.75	1.5	1.5
COST:	438.05	517.25	648	939.5
Seed	9.8	14	21	30
Rate (kg/ha)	14	20	14	20
Price (N/kg)	0.7	0.7	1.5	1.5
Fertiliser	n.a.	30	n.a.	100
Rate (kg/ha)	n.a.	250	n.a.	250
Price (N/kg)	n.a.	0.12	n.a.	0.4
Herbicides	n.a.	45	n.a.	150
Rate (litres/ha)	n.a.	3	n.a.	3
Price (N/litre)	n.a.	15	n.a.	50
Seed dressing	n.a.	10	n.a.	45
Sprayer	n.a.	25	n.a.	50
Hand implement (depreciated)	8.25	8.25	27	14.5
Labour:	420	385	600	550
Man-days (no.)	60	55	60	55
Wage rate (N/man-day)	7	7	10	10
Gross Margin per hectare	86.95	607.75	402	1310.5
Return to labour per man-day	1.45	11.05	6.70	23.83

n.a. = The particular input was not applied by the farmer

Source: CBN/NISER 1991 SAP Study

TABLE 2: OPERATIONS OF AGRICULTURAL DEVELOPMENT PROJECTS

YEAR	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Total Funds Available (N'Million)	442.4	391.9	410.6	390.4	448	1217.5	1493.5	2119.7	1280	736.7
Source: % Share of	275.4	190.8	155.2	247.2	241.9	804.7	951.7	1375	937	473
IBRD/IFAD	62.3	48.7	37.8	63.3	54.0	66.1	63.7	64.9	73.2	64.2
FGN, SGs and Others	37.7	51.3	62.2	36.7	46.0	33.9	36.3	35.1	26.8	35.8
Rural Roads (Const., mntd., or Rehab. in km)	5273.5	5882.7	4199.7	1443.8	2747	6791	3671.5	2286.7	1072.4	715
Dams, bore-holes, tube-wells (no.)	1554	3699	5523	5121	5190	5523	325.7	8108	9841	0
Farm Service Centres (No.)	6	92	893	597	383	722	562	505	434	501
Farm inputs supplied										
Fertilisers ('000 tonnes)	514	729	667	225	344.7	1410	331.9	208.7	522	0
Agrochemicals ('000 litres)	116.8	108.5	67.9	122.9	876.7	303.5	110	69	542.6	183.7
Seeds ('000 tonnes)	4.3	10.4	29.9	89.9	14.6	1.4	12.9	47.2	113.4	0
Farm implements (no.)	7345	127	6514	9732	6052	16995	6389	852	4985	0
Extension and Training										
Farm Families Covered ('000)	2517	3455	3917	5313	4764	6090.5	5823.7	11522.5	6455	4670
Extension Agents (No.)	n.a.	n.a.	n.a.	n.a.	n.a.	7804	6412	7027	6617	n.a.
Number of farmers trained ('000)	9.9	8.2	4.9	14.5	159	6526	4481	4498	4521	3987
Number of farm visits	312.8	604.3	60431	787	1541	n.a.	n.a.	n.a.	1203	1649
Total production within project areas (tonnes)										
Maize	2346.9	3217.6	3434.2	220.8	428.8	n.a.	357.1	n.a.	1232.5	n.a.
Sorghum	4852.7	5359.8	5824	n.a.	n.a.	n.a.	866	n.a.	n.a.	n.a.
Cow-pea	312.7	258.6	657	1871.2	161.5	n.a.	94.1	n.a.	214.9	n.a.
Yam	8354.5	8458.8	8946	163.4	1978.2	1926	1579.3	n.a.	6289.1	n.a.
Cassava	8364.5	3772.4	4745	411.1	47.8		2226.6	n.a.	6477.8	n.a.
National Yield per ha (KG)										
Maize: National	1305	1577	1422	1535	1571	725	812	1143	1143	1100
ADP	2000	2100	1900	1700	1500	1510	1423	1588	1600	1615
Sorghum: National	768	9831	1202	1024	1048	574	602	1106	1000	1050
ADP	1301	1071	1410	1024	1154	970	1052	1410	1506	1418
Yam: National	11272	10779	12918	13564	12821	6631	6504	10032	10050	10100
ADP	11371	10891	13451	15100	14110	10508	11006	9976	10170	12151
Cassava: National	11642	14723	23859	23600	15783	13544	13288	9726	10700	11000
ADP	11751	13561	19788	25671	17388	16754	10898	10767	13288	16793

n.a. = Not available

Source: Compiled from data from the Central Bank Publications supplemented with CBN's Annual Survey Returns

Table 3: Total Federal Budget Allocations to Agriculture and the Share of Fertiliser Price Subsidy Programme

	1989	1990	1991	1992	1993	1994
N A I R A M I L L I O N						
Total Budget Allocations	15904.4	21376.3	22048.2	27435.8	56880.4	68820.4
Total Allocation to Agriculture	1447.3	1988	2425.3	2222.3	5801.8	6400.3
Agric & Water	937.3	988	1397.3	1622.3	3801.8	4400.3
Fertiliser	510	1000	1028	600	2000	2000
Per Cent Share of						
Agric in Total Budget	9.1	9.3	11	8.1	10.2	9.3
Agric & Water	5.9	4.6	6.3	5.9	6.7	6.4
Fertiliser	3.2	4.7	4.7	2.2	3.5	2.9
Per Cent Share of						
Agric Total	100.0	100.0	100.0	100.0	100.0	100.0
Agric & Water	64.8	49.7	57.6	73.0	65.5	68.8
Fertiliser	35.2	50.3	42.4	27.0	34.5	31.2
Estimated Cost of Fertiliser Subsidy						
Total Purchase Price (N/tonne)	2099	2275	2758	4074	5458	7066
Official Price (Naira/tonne)	300	400	800	800	1600	3000
Subsidy (Naira per tonne)	1799	1875	1958	3274	3858	4066
Estd. Actual Procurement ('000 mt)	883.7	984.1	810	907	810	907
Total Value of Subsidy (N/Billion)	1.6	1.8	1.6	3.0	3.1	3.7
GDP at Cur. Mkt. Prices (N'Billion)	230.2	285	338.1	529.5	770.7	914.9
Spending as % of G.D.P.						
Subsidy	0.69	0.65	0.47	0.56	0.41	0.40
Agric Total	0.6	0.7	0.7	0.4	0.8	0.7
Fertiliser	0.2	0.4	0.3	0.1	0.3	0.2
Agric & WR	0.4	0.3	0.4	0.3	0.5	0.4

Source: World Bank, 1996: Nigeria: Federal Public Expenditure Review, Report No. 14447-UNI

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