PN ABL 991
78370

A STRATEGIC FRAMEWORK FOR COMMODITY SYSTEMS RESEARCH IN AGRICULTURE

Final Report

Presented by Fulfillment of USDA Purchase Order # 40-319P-1-00227-00 dated 26 February 1991 as amended

John H. Eriksen
Ithaca International Limited
707 Cayuga Heights Road
Ithaca, New York 14850

May 1991

Preface

This paper was written in fulfillment of the scope of services in USDA Purchase Order # 40-319P-1-00227-00 dated 26 February 1991 as amended. It is intended to be a modest contribution to AID/Bureau for Africa's Strategic Framework for Research on the Agricultural Sector in Sub-Saharan Africa. The distribution of which is anticipated later this year.

The present work was written by John H. Eriksen, agricultural economist, of Ithaca International Limited, Ithaca, New York in March and April 1991. The paper extends and enlarges upon concepts and ideas contained in an earlier paper entitled Agricultural Markets and Economic Development in Africa. This paper was co-authored by Garry N. Christensen and John H. Eriksen and submitted to AID/ Bureau for Africa in June 1989. The structure and contents of this paper benefitted greatly from the perceptive comments and additions of Daniel G. Sisler, Professor of Agricultural Economics, Cornell University, Ithaca, New York.

Table of Contents

		Page
I.	Introduction	2
II.	Components of an Agricultural Production/Marketing System	3
	A. System Components	3
	B. Interrelationships Between Components	5
	C. Characteristics of African Commodities and Production/Marketing Systems	9
III.	Researchable Constraints	
	A. Constraints and the Country's Stage of Development	19
	B. Identification of Researchable Constraints	23
	C. System Components and Optimal Government Policies	26
	D. Operationalizing the Use of American Expertise	27
	E. Examples of Commodity System Research in Sub-Saharan Africa	33

Annex A -- Scope of Services

Annex B -- Report Bibliography

Executive Summary

This paper seeks to make a modest contribution to AID's development of a new strategic agricultural research framework for sub-Saharan Africa by:

1. Presenting an analytical framework which demonstrates that many of the key components in African agricultural production/marketing systems lie outside "agriculture research" as narrowly defined in many AID programs;

2. Showing that African agricultural production/marketing systems are always affected -- and ofttimes severely constrained -- by endogenous and exogenous factors which lie outside the narrow confines of production processes per se;

3. Demonstrating how consideration of such an analytical framework can assist decision-makers to better focus research investments on key problems and issues within specific agricultural production/marketing systems; and

4. Indicating how the mix of research on production, marketing and policy constraints might vary depending upon not only a country's stage of development, but also the nature of the commodity under consideration.

Agricultural production/marketing systems in sub-Saharan Africa, as elsewhere, are by nature complex. If one is to gain a full appreciation of such systems, consideration must be given to the full range of operative components in each discrete commodity system and their interrelations one with the other.

If a country is at an advanced stage of economic development, specific commodity systems may be extensive, highly articulated and entail significant interrelationships between all of the components. On the other hand, in early stages of economic development, many production/marketing systems may display weak or inconsequential linkages between components.

The strength and efficiency of linkages between components in a specific commodity production/marketing system are affected by both endogenous and exogenous factors. Endogenous factors are those factors <u>within</u> a system which may constrain performance but are effectively under the control of system participants. Exogenous factors, while having potential to significantly affect system performance, are by definition outside the control of system participants.

The paper details a nested series of exogenous factors which pertain to virtually all commodity production/marketing systems in sub-Saharan Africa. It shows an ordering of these constraints by relative importance to producers and marketing agents. The report also presents the projected relationships between the components of a commodity production/marketing system with respect to the five stages of economic development projected in AID's <u>A Strategic Framework for Promoting Agricultural Marketing and Agribusiness Development in Sub-Saharan Africa</u>.

Agricultural production/marketing systems become increasingly complex and more articulated

as a country progresses through successive stages of development. In Stage I, there are often only weak backward and forward linkages between on-farm production processes and components concerned with provision of agricultural inputs and with the marketing of outputs. This is reflective of the fact that production operations in this stage of development use very limited quantities of purchase inputs; that the quantities of marketed flows and qualities of harvested output are highly variable both spatially and over time; and that a large majority of harvested commodities are prepared by family labor and consumed within the farm household. Very limited sales occur and they are confined almost entirely to local markets.

By Stage III, farm businesses have emerged to the point where most output is intended for commercial markets and on-farm operations use significant quantities of purchased inputs. The evolution increases the importance of efficient component linkages for producers both at the enterprise and household levels. It also means that actions and performance of many other economic actors must now be considered in the commodity system.

Stages IV and V represent descriptions of commodity production/marketing systems generally found only in middle and high income developed countries.

Evidence has shown significant differences between the major commodities produced in Africa. These differences have often been summarized as simple dichotomies -- i.e. subsistence versus marketed crops, food versus cash crops, crops versus livestock, and domestic versus export commodities. Such distinctions are of questionable value, however, in assessing commodity research priorities because they rarely remain static as economies develop and mature. For example, sorghum, maize or upland rice are often judged to be primary subsistence crops in a Stage I economy but major market crops in a Stage III economy. The relevance of the food versus cash crops dichotomy to issues like food security also blurs as national structural adjustment efforts lead to more open economies. In such situations, increasing foreign exchange receipts from successful commodity export programs may be as relevant -- and, in some cases, more relevant -- to national food security objectives as investment in research to increase domestic production of food crops for which the country has no demonstrable comparative advantage or for which low cost close substitutes are readily available in international markets.

If an effort is made to clear away the confusions which occur when research programs are based on these dichotomies, careful study of the specific differences between commodities can often result in much better assessments of prospects for successful research under a given set of AID investment objectives. The paper presents a synopsis of differences between major commodities in Africa based on eight characteristics. They are:

1. Importance in Food Security;
2. Production Research Potential;
3. Processing/Marketing/Policy Research Potential;
4. Transport/Handling/Storage Characteristics;
5. Potential for Value-Added in Processing and Marketing;
6. Importance of Joint Products;
7. Export Market Potential; and
8. Degree of Challenge from Imports.

Since the objective of this paper is to consider agricultural research potential in the specific context of AID investment strategies, an assessment of two additional characteristics relevant to each of 35 commodities is considered. They are:

9. American Comparative Advantage in Research; and
10. Legislative Prohibitions Against Research.

In the first instance, the feasible area for AID involvement in agricultural research broadly defined is bounded by the last two commodity characteristics. A review of existing Legislative Prohibitions Against Research -- with information provided by USDA specialists -- shows that 7 of the commodities listed may be effectively eliminated from research consideration because they face moderate to strong legislative prohibitions. Another 5 commodities may face some prohibitions which, while not precluding them from consideration, may alter the conditions under which research programs can be conceptualized and implemented. Finally, 22 commodities appear to be free of legislative prohibitions. The generic category for specialty crops could not be categorized.

If the constraint imposed by the lack of American Comparative Advantage in Research is next taken into consideration, the paper shows that prospects for success with certain commodities is further diminished. Comparative advantage is estimated to be low in both production and marketing aspects for 7 commodities and limited in production aspects for another 2 commodities. On the positive side, commodities for which a high to very high degree of American comparative advantage exists are:

1. Crops : Maize, wheat, dry beans, cotton, oil groundnuts, confectionery groundnuts, other oilseeds (particularly soybeans), citrus, vegetables and tobacco in all aspects. High levels of expertise exist for certain research on rice, millet, sorghum, potatoes and coffee.

2. Livestock : Poultry, milk and other dairy products in all aspects. High levels of expertise exist for certain types of research on beef, lamb/mutton, goatmeat and cultured fish and seafood.

If Characteristics 9 and 10 are taken together, the major commodities which appear to be at least feasible targets for AID agricultural research are as shown in Text Table 3. Our findings indicate that the feasible area for AID research on complete commodity production/marketing systems may be limited by legislative prohibitions and/or lack of strong comparative advantage in research to twelve commodities or groups of commodities -- six crops, five livestock commodities plus cultured fish and seafood. More limited types of research may be feasible with respect to nine crops, one livestock commodity plus captured fish and seafood. Again, potential for specialty crop research cannot be determined at this time.

In considering national and regional commodity research programs in sub-Saharan Africa, one is then faced with weighing the benefits and liabilities inherent in the other eight characteristics as they apply to each commodity. Obviously the importance of each of these commodities varies significantly between national economies and agro-ecological zones within Africa.

Generalizations taken to the continental level, therefore, appear to be inappropriate in allocating limited AID investment funding.

In this regard, it is probable that an AID system which ranked agricultural commodity research proposals from missions competitively in accordance with a discrete set of relevant economic criteria would be preferable to one which declared certain commodities a priori to be the only acceptable targets for research. Economic criteria in a new system might include the following:

1. The estimated economic rate of return for the proposed research program;

2. The potential for increasing total revenue flows and multiplier effects within the national economy;

3. The potential for increasing wage employment in the national economy;

4. The projected direct and indirect effects of the research on national food security; and

5. The potential for growth of agro-business and other private sector enterprise involvement in the commodity production/marketing system.

A new and competitive system for allocation of AID investment in agricultural research based on these criteria would, in our opinion, have several highly beneficial effects on the planning and conduct of agricultural research programs. These include:

1. Requiring national and AID program planners to evaluate the relevance of all components of a specific commodity production/marketing system;

2. Requiring detailed consideration of the linkages between a given commodity system and the national economy within which it must function and evolve;

3. Forcing active collaboration between technical specialists and economists in a highly focused manner from conceptualization through implementation of any research effort; and

4. Reducing the number of research proposals at the mission design stage when detailed analyses clearly demonstrate limited potential for addressing the relevant criteria.

When the process of selecting a small number of high priority commodities for research consideration has been completed and planners have placed each commodity production/ marketing system in the context of its stage of development, the next step in the planning process is a detailed evaluation of the specific constraints which presently hinder the development of each system. This process must be highly specific for commodity system under consideration and it is important to realize from the outset that system constraints cannot generalized a priori even at the national level -- much less on a continental basis. Detailed analyses on specific

commodity systems will demand that more time and resources be devoted to the development of effective research proposals. But, at the same time, a review of the existing literature leads us to conclude that lack of analysis of commodity system components in the research planning stage has been the single greatest weakness in many AID-sponsored research programs in sub-Saharan Africa over the past two decades.

Too often agricultural research efforts have been conducted in the context of designated geographic zones; have attempted to allocate extremely limited resources over too many different commodities; have assumed a priori that lack of improved production technologies was the binding constraint in all systems; and that investment in the institutional aspects of research programs would necessarily lead to timely production of relevant outputs.

We believe, to the contrary, that research programs must be highly focused efforts which plan a research strategy on the basis of a prioritized list of the operative constraints for the specific commodity systems under consideration and the recognition that binding constraints can occur within any of the system components. Identification of specific constraints, therefore, becomes the sine qua non for effective program planning and mobilization of appropriate resources.

Identification of constraints is a process which necessarily proceeds from the general to the specific. Planners must have a general understanding of the constraints that could affect the performance of a commodity system at each level. Moreover, recognition that constraints change as a system evolves and that their effects become more complex and subtle as systems become more articulated and more linkages develop between components is essential to research planning and program implementation.

For most African economies in Stages I to III, commodity systems perform poorly. Participants at all levels operate under high levels of risk and uncertainty in planning and managing on-farm enterprises and agribusinesses. Participants -- particularly if they are close to the subsistence margin -- are justifiably very cautious in adopting any new technology because their experiences have shown that poor weather conditions, insects and pest attacks, diseases and any number of other factors can quickly reduce or eliminate any benefits of technology adoption. And, where yield increases do occur, inefficiencies in processing and/or marketing often drain away financial returns to the point where farm households are left with no incentives to continue the new production practices.

In processing and marketing, controlling costs per unit of product becomes extremely difficult where commodity input flows are highly variable in quantity and quality over time. Many agribusinesses and trading firms operate in thin residual commodity markets on a highly seasonable basis. In such markets, modest variations in commodity flows can have enormous effects on prices, commercial margins, and absolute losses in storage and transit.

These problems are compounded where public policies constrain the plant manager or trader's ability to respond quickly to changing market conditions through rigid wage and employment regulations, restrictions on the mobility of commodities and factors of production, fixed prices and commercial margins, etc.. Flexibility is particularly important in African markets where consumers generally have low purchasing power and there is not a high degree of product

differentiation. Processors and marketing agents in these situations cannot easily pass margin premiums for risk and transactions costs on to consumers without incurring the added risk of significantly reducing the effective demand for their products.

The evolution from subsistence to fully commercial agricultural production in Africa inevitably brings with it the potential for increased household food insecurity and greater vulnerability to changing market conditions. Where agricultural input and output markets are not permitted to function in accordance with competitive market forces, producers, processors and marketing agents tend to adopt one of two response strategies. They either refuse to assume the risks implicit in higher degrees of market participation; or, where financial benefits can be realized, they may respond to market distortions by adopting not only new technologies but completely new enterprises. In the process, they will often be seduced into over use of subsidized inputs, marketing their commodities through government parastatals at fixed prices, and misallocating scarce resources to uneconomic ends in pursuit of short-term financial gains.

Where successful transitions from subsistence farming to fully commercial production/marketing systems have been made in Africa, they have been grounded in a process of active collaboration between governments, commercial processing and marketing firms, and organized producer groups. Modernizing commodity systems in Africa has been most successful in the context of higher value commodities processed and marketed through narrow channels. Public/commercial collaboration has generally focused on identifying and removing those constraints presenting the greatest levels of risks to participants in organized and influential groups. These actions have been directed at:

1. Securing public investments in transport and communications infrastructure which lowers transit and transactions costs;

2. Ensuring substantial autonomy for firms in the conduct of their production, processing and marketing operations;

3. Reducing constraints on factor use and mobility;

4. Funding specialized commodity research and extension programs from public resources and special levies on product sales;

5. Securing active government participation in assessing export market potential, supporting pilot marketing programs and product promotions, and facilitating commodity marketing agreements;

6. Ensuring access to domestic credits and/or foreign exchange allocations on a timely basis for suppliers of agricultural inputs and for modernization of agribusiness plant and equipment; and

7. Removing barriers to market entry and system participation.

In sum, then, successful evolution of commodity systems in Africa has required detailed analyses of the performance of and interactions between all relevant system components and then precise targeting of public and private resources to eliminate bottlenecks wherever they are found within a system. It has also required an equitable sharing of the benefits derived from the active partnership between public and private sector agents.

Agricultural research in Africa defined in narrow terms has usually been thought of as the exclusive charge of public research institutions -- domestic and international -- with support provided largely by external donor agencies. We believe this approach has proved deficient in at least two respects. First, the underlying hypothesis that the poor performance of commodity systems is attributable primarily to the lack of supply response by farmers and that this in turn is caused by the absence of improved crop and livestock production technologies has clearly not proven to be the case for all commodity systems.

A second deficiency is that the research process has tended in many instance to exclude key system actors -- both public and private -- from effective participation in setting comprehensive research agendas which would address their needs and provide incentives for their active collaboration in the execution of research and their support in implementation of recommendations.

Broadening the working definition of "agricultural research" to include analyses of entire commodity systems is obviously not a panacea. It would, however, provide the basis for including a more comprehensive set of participants in a structured evaluation of system constraints and solutions. This would be beneficial not only in promoting interaction between key public and private sector actors but also in focusing resources within governments on specific problems. This would have enormous benefits in resolving many of the constraints imposed on commodity systems when government ministries formulate policies and initiate interventions for different components of a system independently without sufficient appreciation of their impacts throughout the chain.

The paper presents a synthesis of the types of public policies and interventions which best typify this redefined role for governments in the agricultural sector. In the process, we have attempted to relate optimal policies and interventions to commodity production/marketing components and the relevant stages of economic evolution as described earlier in this report.

We suggest that the process of formulating and implementing commodity research and system reforms must include the following discrete steps.

1. An Appraisal of the Macroeconomic Environment Within Which All Commodity Systems Must Function

2. Assessment of the Agricultural Sector

3. Solidifying Public Support for Commodity Research and System Reform

4. Rapid Appraisal of Individual Commodity Systems

5. Selection of a Specific Commodity System for Reform

6. Collaborative Establishment of the Research Agenda and the Phasing of Actions to be Taken

7. Implementation of the Systems Research/Reform Agenda

The seven step process outlined above is different in concept and phasing from that used in many agricultural research efforts in Africa in the following respects:

1. It is broad based in approach and nested within a realistic appraisal of the array of factors influencing a specific commodity system;

2. It presents a coherent flow of activities from the general to the highly specific in the research and system reform effort;

3. It puts great stress on first involving and then informing -- and being informed by -- all relevant participants in a specific commodity system;

4. It emphasizes the essential step of building a collaborative and working consensus around each research activity and subsequent reform implementation effort;

5. It removes the dangers of the research process being captured by small groups of specialized researchers and/or institutions by stressing the development of a comprehensive agenda which addresses all relevant components of a commodity system and places resources at the disposal of each relevant component within that system;

6. It places the responsibility for the process squarely on relevant local decision-makers with respect to execution and evaluation; and

7. It defines in precise terms the linkages between agricultural research and implementation of the recommendations flowing from that research and makes <u>both</u> activities the shared responsibility of the participants.