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THE COLD HARD REALITIES OF AGRICULTURAL DEVELOPMENT

by

Clyde Eastman

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MIXED FARMING AND RESOURCE MANAGEMENT PROJECT
TECHNICAL REPORT NO. 7

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MIXED FARMING PROJECT
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THE COLD HARD REALITIES OF AGRICULTURAL DEVELOPMENT

Introduction

Agricultural development is a highly complex process. It has social, economic and technical aspects, all of which must function more or less in concert if development is to occur. It is all too easy for any specialist working in one project or program to lose track of where or how his/her work contributes to the complex whole. Hence, it is useful to review the development process and place the various components in perspective. The purpose of this paper is to present a schematic overview of agricultural development for Gambian and expatriate agricultural scientists. It provides a background for the various socioeconomic assessments of Mixed Farming Project activities to be written during the last year of the Project. If in addition, it challenges a few old assumptions and precipitates some debate it will have accomplished its purpose.

The voluminous literature resulting from more than three decades of international development experience provides the development practitioner with an abundance of theories and accumulated 'wisdom'. While there are many unique cultural, geographic and historical forces which influence the course of Gambian events, there are also some common social and economic forces plus technologies which transcend any particular culture or country. Thus, agricultural development has a set of predictable characteristics and problems wherever it may occur in the world. This paper presents a synthesis and summary of the model and related concepts which will be applied in subsequent Mixed Farming Project publications. It establishes in advance the issues which will receive attention and provides a rationale for their selection.

The model is simple, it has no formulas, no Greek symbols and is not computerized. The components seem commonplace and indeed they are. There is nothing revolutionary and no panaceas are proposed. The value of this model lies in the explicit, systematic consideration of the interrelated components of development. It permits evaluation of what is possible and what is unlikely. This appraisal in turn can guide and orient both individuals and institutions involved in development programs and projects.

The paper is organized as follows : First is a discussion of the nature of development in a typical developing country. Next the components of agricultural development are presented followed by a brief discussion of the basic elements of adoption and diffusion of innovations. Finally, the major implications of this approach for agricultural developments in The Gambia are examined.

The Nature of Development

What is development? A simple sociological definition is that development is planned change. By extension, agricultural development involves planned changes designed to increase food and fiber production. While it may be embellished in many ways, agricultural development almost always involves increasing production.

In what context does development usually occur? Agriculture started out everywhere in the world as an activity with the primary aim of providing food and fiber for the farmer and those directly dependent on him/her. Excess commodities might be sold or bartered for other food or non-food items but the primary purpose of most husbandry was to provide <u>subsistence</u> for consumption by the production unit. In contrast <u>commercial</u>

agricultural production focuses on the market and often on one or a few commodities which are produced for cash income. Much agricultural development in the third world, and The Gambia is no exception, involves a shift from subsistence to commercial production. There are several differences between subsistence and commercial agriculture which may profoundly influence the development process. These differences are frequently overlooked by scientists engaged in the day to day struggles of project implementation.

The first difference is that commercial agriculture usually employs more complex and scientific technology which often requires more purchased inputs. It comes down to simple arithmetic, if fertilizer, hybrid seed, pesticides or supplemental feed increases income by more than their cost, then they will probably be applied. In contrast, a purely subsistence operation generates no cash with which to purchase inputs. Therefore, for example, to apply fertilizer to a subsistence crop the farmer must either change the entire nature of the crop, i.e. commercialize it, at least partially, with all that implies or he/she must subsidize it out of other cash income. In these circumstances adoption of new technology takes on quite a different meaning than in a commercial enterprise.

The second difference is that commercial agriculture concentrates risks. In any kind of agriculture the producers stand to lose everything from the time the various inputs are employed until the commodity is delivered to market or consumed, e.g. animals may die or an insect infestation may ruin a crop at any time. A subsistence farmer may lose his/her time and seed but little more. Subsistence farmers attempt to reduce their risks by diversifing among several commodities, genetic material, and production sites. This significantly reduces the likelihood of a total failure. Thus when climatic conditions turn unfavorable or there is some malady, the family may not eat so well but it will still have something. Gambian farmers are very

familiar with diversification. Their major crops have sufficiently different characteristics to provide substantial diversification. The cropping system is further backed up by livestock so that even in years of complete crop failure livestock sales still provide cash for food purchases.

In contrast, the commercial farmer, being specialized in one or a few commodities, runs a much greater probability of a major failure. Nature or an adverse market can ruin the entire year. Further, since the commercial farmer is often leveraged with borrowed capital he/she stands to lose not only what was his/hers but what was borrowed. Creditors often seek repayment from whatever is left, be it land, house or future labor. Thus, while commercial agriculture can be very productive and profitable a few adverse years may wipe out an inheritance or the savings of a lifetime. Most farmers are at least intuitively aware of the risks. However, a few years or decades of success may dull their memories. Witness the current generation of American grainbelt farmers who are being re-educated in the consequences of the risks of an overly aggressive commercial agriculture.

Gambian agriculture is a mixture of subsistence agriculture with one major commercial component, i.e., the groundnut. While groundnuts have been widely grown for a very long time, very few farmers are totally dependent on them. Rather, the vast majority of rural Gambians have one foot in commercial agriculture and the other firmly planted in subsistence production. Most Gambian commodities actually fall somewhere between the commercial and subsistence ideal types. Surpluses of the subsistence commodities are regularly sold and some of the principal commercial crop is consumed. While small livestock may be viewed as a primarily subsistence commodity, cattle have a more complex role. They provide a kind of living savings account, manure for the fields, draft power, milk for the table or sale plus a measure of social status and spiritual well-being for their owners. Any attempts to alter production practices needs to take

into account the role of that particular commodity for the producers in question.

Two additional characteristics differentiate subsistence from commercial agriculture and influence development efforts. Taste, cooking and storage qualities are very important to producers of subsistence crops and often present obstacles to change. While commercial commodities must also meet quality standards these are often easier for the technical expert to anticipate than are the local subsistence requirements. A final and somewhat more subtle difference is that subsistence production is inherently finite. The producer and dependents can consume only a fixed amount of any particular commodity before it deteriorates. Since most food items have a limited "shelf life", especially in the tropics, the farmer is not inclined to produce more than what will be needed for the next year. In contrast, commercial production is inherently infinite. Few commercial producers ever produce "enough" ; "more" income is always desirable. They may characterize their crop as good or even excellent but how many times is one ever heard to say that he/she produced "enough"? Thus subsistence farmers accustomed to finite expectations may not immediately adopt the infinite aspirations of their commercial brethren. They may be more inclined to employ new technology to reduce their work load rather than to increase their production.

The Components of Agricultural Development

Arthur Mosher's Getting Agriculture Moving presents in non-technical language an overview of agricultural development (1). Agriculture is a social activity with the goal of producing food and fiber for the use and benefit of human beings. Agriculture is an economic activity in which costs and returns are important. Agriculture is a technical activity which involves the combination of diverse elements, e.g. land, labor,

water, seed and chemicals to produce a specific crop or livestock. All the diverse social, economic and technical activities are integrated by each and every producer on each and every farm.

Agricultural development cannot be achieved by individual farmers acting alone. As productivity rises there is an increased interdependence with the rest of society. For example, inputs must be purchased from and produce must be sold to non-farmers and much of the knowledge required to apply the new practices is also obtained from outside.

There are five essential facilities and services, listed in Table 1, which must be available to producers if agriculture is to develop. These elements are interdependent and must articulate more or less in harmony. If any one approaches zero availability no development will occur even if there is a super abundance of all other elements. Development is better expressed as the mathematical product and not simply the summation of the five components.

In addition to the five essentials, there are five accelerator elements. As the term implies these elements can speed up the development process but they are not absolutely vital to it. Agricultural development can occur in the absence of one or even all of the accelerators. Let us briefly elaborate on each element and accelerator in turn.

Table 1. Essential and Acclerator Elements of Agricultural Development, as Identified by Mosher.

Essential Elements	Accelerators
1 . Markets	1. Education
2. Locally Available Inputs	2. Credit
3. Technology	3. Group Action
4. Incentives for producers	4. Land Development
5. Transportation	5. National Planning

Essential Elements

Markets: Since agricultural development almost always attempts to increase output, there must be a demand for the additional produce, there must be a marketing system capable of handling the additional volume, and farmers must have confidence that the system will work. If the farmer does not perceive a reasonably certain market, he will not produce more, and rightly so. The demand can be domestic or foreign but it must exist. Unless the producer is very large, he cannot afford to go to the capital or to an international market center to arrange a buyer. Therefore, for most producers, a local buyer must be available. Finally, the producer must be reasonably confident that he will be able to sell, the additional produce the first year and every year thereafter.

Locally Available Inputs: As with selling their products, most producers cannot go into the international or even national market place to purchase their inputs of seed, fertilizer, pesticides, or machinery. If the inputs cannot be purchased in the traditional market centers the producer normally visits, they are essentially unavailable to him. In addition, since most

agriculture is seasonal with critical dates for many operations, timeliness is also important. Unless inputs are available locally and on time development will not occur.

Incentives for Producers: To some extent the producer and his family must have some unsatisfied felt needs which can be met with the cash income from the increased production. In some cultures, money per se, is not as effective an incentive as it is among middle-class westerners. Some attention must be given to how people will respond and to what incentive. Incentives must be tailored to the system or farmers will not produce more.

Transportation: Production zones are often far removed from population centers which consume food and fiber and from input distribution points. Hence, both produce and inputs must be transported. Both cost and time are important factors. The lower the transportation costs, the greater the proportion of the selling price that is available to cover direct production cost and producer profits. Rapid transport is necessary for some products while frequent transport is required from others. The farmer will not use that which cannot be transported to his/her farm nor produce that which cannot be shipped out economically.

Technology: The term technology as used here means biological, physical and management practices. Technology is often most effective when introduced in packages, e.g. an improved variety, pesticides, fertilizer plus one or more cultural practices. The total impact of the package is generally much greater than the sum of the individual effects. Unless production increases are obtained simply by expanding the acreage cultivated then new technology will be required. Furthermore, the technology may only be new to those adopting it. It may have been in use elsewhere for many years.

As was stated earlier, these five essential elements are interdependent. Not only must all five be present but they must articulate together more or less in harmony for agriculture to develop.

Accelerators

Education: In addition to the foregoing essentials, Mosher specifies five accelerators (see Table 1). Education accelerates the continuous learning which must always accompany change. As the more formal, institutionalized part of learning, it consists of adult education, short courses and extension programs for farmers, upgrading of technical personnel as well as primary, secondary and higher schooling. Since new ideas must move from sources to many individuals, effective communication is vital for development. This model assumes that communication is effective and that learning can take place.

Credit: Credit facilitates the purchase of necessary technical inputs. Since capital requirements increase sharply as development occurs, borrowed capital becomes an important facilitator of technological change.

Group action: This accelerator can take a variety of forms e.g. construction of community facilities, control of a common pest, formal cooperative organizations to purchase inputs or market produce and organized political action.

Land development: Land development includes projects such as drainage or irrigation, clearing to bring new land under cultivation and other programs which extend the land base or enhance its productivity. The irrigated rice projects provide a Gambian example of this accelerator.

National planning: A function of government, planning can facilitate development by focusing governmental action on the most important tasks. In its completely evolved form, planning is a very complex process which established priorities and charts the direction for the whole sector.

These, then, are the more important components of agricultural development. Gambian producers are subject to the same set of constraints as are other agricultural producers. They must have a market, effective incentives, economical transportation, locally available inputs and effective new technology if they are to produce more. And the accelerators work the same in The Gambia as elsewhere.

The Diffusion of Innovations

Probably the most widely applied theory in rural sociology is presented by Rogers in the third edition of Diffusion of Innovations (2). More than 3,000 diffusion publications are summarized and synthesized in what has become the standard reference on the subject. Only a small portion of that total model will be presented here. In brief overview the model holds that an innovation is communicated over time among the members of a social system. In the most common situation the innovation is promoted by a change agent who has the responsibility to encourage adoption by a client group. The change agent may be a government employee, e.g., an extension agent, or he/she may be in private business, e.g., an input salesman.

The book elaborates on each element of the model, however, only the innovation will be considered in detail here. "An innovation is an idea, practice of object perceived as new by an individual or other unit of adoption"(2, p.35). It is the perception of the adoption unit which is important. "Objective"

or expert perception of the innovation is not, in the end, what moves the individual adopter. Innovations have five characteristics or attributes which are important in the development process:

Relative advantage is the degree to which an innovation is perceived as better than the idea it supersedes... New practices must promise substantial increases in production or cost reduction. The increase required for adoption seems to be inversely related to the level of development of the producer Subsistance producers may often require an increment of 50 to 100% while modern producers accustomed to using new ideas may require only a 10 or 15% increment for adoption.

Compatibility is the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of the potential adopter...

Complexity is the degree to which an innovation is perceived as difficult to understand and use...

Trialability is the degree to which an innovation may be experimented with on a limited basis...

Observability is the degree to which the results of an innovation are visible to others...(2, pp.15-16).

Since these attributes of an innovation influence adoption rates, they therefore merit close attention during the design and implementation of development programs. The innovation can often be modified or presented differently by the change agent in order to speed adoption.

Implications

I. Obstacles to development projects occur at both the individual and the system levels.

Some observers of the many applications of the adoption - diffusion model have pointed out that it tends to hold the individual responsible for his/her problems. This bias stems from the focus on the adopter rather than on the environment in which he/she lives and operates. It would blame, for example, users of infant formula for not boiling the water, diluting it too much or not refrigerating it rather than blaming the manufacturer for trying to replace sanitary and nutritious breast milk with a product which is both expensive and impossible to keep sanitary in most third world households.

Probably the majority of extension and community development workers, at least those outside the communist block, have been exposed to and actually apply adoption-diffusion principles in their programs. Much of the paradigm has proven very useful in these applications. There is every reason to continue using the adoption diffusion paradigm provided it is balanced with a system level perspective. This is how Mosher's model compliments the adoption/diffusion approach. The former provides a system level perspective while the latter provides an individual or micro perspective. Since obstacles to development can and do occur at both the individual and the system levels, both perspectives can contribute to successful project design and implementation.

II. Individual development projects have a limited impact without a generalized and concerted effort across the entire agricultural sector.

The interdependence of the elements of development precludes great advances in one area without simultaneous advances in the other areas, e.g. production cannot outpace demand for very long

or by very much. Further, production of a single commodity like a food grain rarely develops faster than the agricultural sector as a whole. Occasionally, one may find a very modern export sector side by side with an otherwise traditional and largely subsistence agriculture. But a commodity for domestic consumption produced by innumerable small and medium farmers who also produce other crops cannot develop independently of the general agriculture sector. Gambian development projects involve, almost exclusively, that class of agriculture.

III. Relatively few of the essential elements of development are manipulated by international assistance projects.

Assistance projects typically focus on only one of the essential elements, technology plus two or three accelerators. Producer incentives, which were ignored by development practitioners for so long, have been receiving more attention in the last decade. However, there are still many attempts to control food prices and this always means reducing producer incentives. Inputs such as fertilizer and improved seed are sometimes provided as part of a production credit package which may or may not arrive on time. Also government agencies sometimes undertake to buy the expanded production. The point is that many development projects do not cover all the essential elements in the coordinated and systematic fashion required for development to occur.

IV. The "technological fix" has definite limits.

The adoption - diffusion paradigm has also been criticized for a pro-innovation bias. This bias implies that all innovations are inherently desirable and should be diffused rapidly. At least two factors contribute to this bias. First sociologists who study the adoption/diffusion process are rarely also technically expert enough to adequately assess all the various technical facets of the new technology. They are thus

not able to assess, particularly in advance, the technical soundness of the innovation.

A second factor is the developed countries' continuing belief in and love-affair with technology. In the 1950's, there was going to be either a chemical or a pharmaceutical to solve our every problem. A decade or so later nuclear energy was going to make electricity too cheap to meter. In the present decade micro electronics are expected to solve every problem from community stagnation to weather control.

The belief in a technological fix is particularly common among international development experts. It approaches a "missionary zeal" in extreme cases. It is also politically attractive to host country policy makers. Technology rarely offends anyone as, for example, higher food prices usually do. Again, the system or macro level provides a more complete model of reality. Technology is only one of the five essential elements of development <u>all</u> of which must be present for development to occur. The other essentials often require tough and occasionally politically dangerous decisions. Technology alone will rarely suffice to achieve the needed increases in production.

Summary

This model does not offer the expert an easy way to realize all his/her goals. What has been attempted is to present and illustrate a simple, systematic model of agricultural development. It is essential to have a clear conception of the realistic bounds as to what is possible and what is unlikely in this business. With this perspective in mind, the expert should be better able to tell when and where to push harder with new technology and when to quit beating his/her head against the immovable mud wall. For any project a conscious awareness of the realistic bounds on technological transfer should lead to a more effective overall effort and perhaps indirectly influence the kinds of technology developed. Awareness of the cold hard realities of development will help keep expectations and demands more consistent with possible achievements.

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