AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D. C. 20523

BIBLIOGRAPHIC INPUT SHEET

FOR AID USE ONLY

1. SUBJECT CLASSIFICATION

A. PRIMARY: Economics

B. SECONDARY: Agricultural Economics

2. TITLE AND SUBTITLE

The process and potentials of modernizing agriculture

3. AUTHOR(S)

Brown, D. W.

4. DOCUMENT DATE	5. NUMBER OF PAGES	6. ARC NUMBER
1971	12 p.	ARC

7. REFERENCE ORGANIZATION NAME AND ADDRESS

Department of Agricultural Economics and Rural Sociology, University of Tennessee, Knoxville, Tennessee 37901

8. SUPPLEMENTARY NOTES *(Sponsoring Organization, Publishers, Availability)*

9. ABSTRACT

This paper discusses several key dimensions to be kept in mind if efforts to modernize a nation's agriculture are to succeed. The nine key points: (1) The best form of agricultural modernization depends on the ultimate goal, whether this is to make cheaper food available or compete in world trade, or help campesinos raise their income, or increase employment opportunities in agriculture so as to reduce migration to the cities. (2) Laws, plans, and funds in themselves do nothing; they must be translated into effective programs; people in agriculture must be aware, capable and motivated. (3) Agricultural modernization is a continuing, changing process, requiring constant assessment of problems and the effectiveness of initial programs. (4) Special provision may be needed to help farmers absorb setbacks beyond their control. (5) Effective planning of agricultural modernization involves choosing from among alternatives and establishing priorities. (6) Attention to details can make the difference between program success and failure (i.e., assuring the supply of fertilizer, tractor spare parts, storage facilities, and providing for "slippage" time in program implementations. (7) Don't forget the "unsung heroes" of agricultural progress, i.e., enforcement of grades and standards, tax administration, market information, collection of statistics, weather forecasting, seed certification, regulation of water use, animal health services, soil testing, and other low-visibility factors. (8) There are no universal answers; innovations most feasible and acceptable differ from place to place. (9) Agricultural modernization is increasingly interdependent with other sectors and policies involving transportation systems, price stabilization, international agreements, taxation, industrial development, etc., and also dependent on the motivation of producers, agency personnel, and government leaders. When agency officials consider any particular proposal, they need to be alert to

10. CONTROL NUMBER	11. PRICE OF DOCUMENT
PN-AAB-843	

12. DESCRIPTORS

Economic Development
Factor Analysis
Productivity

13. PROJECT NUMBER

14. CONTRACT NUMBER: CSD-1927 211(d)

15. TYPE OF DOCUMENT

AID 590-1 (4-74)

alternatives that may be more effective. They need to consider what self-sustaining changes are actually likely to occur in future as a result of the proposed action. And they must keep in mind that goals, constraints, and human responses may make the best answer for one situation different from that in another.

DWE 71-5

THE PROCESS AND POTENTIALS OF MODERNIZING AGRICULTURE

David W. Brown
International Professor of Agricultural Economics
University of Tennessee

In this presentation I want to draw attention to several key dimensions that deserve to be kept in mind if efforts to modernize the agriculture of a nation are to be effective. Most of these points will be quite apparent. Yet, in our day-to-day concern with particular problems and activities, it becomes easy to lose sight of the broader picture and how the various parts relate to one another.

My focus will be on modernization of agricultural production--setting the stage for either (a) significant and self-sustaining increases in the farm incomes or output generated by the land, water, human, and capital resources in farming, or (b) savings in the amounts of one or more of these resources needed to produce a certain level of income or output. Analogous opportunities present themselves to other components of the agricultural sector, such as food marketing and input distribution systems. As noted elsewhere in this seminar, modernization of agricultural production is only one of a number of possible ways to expand and redistribute opportunities for improved well being in a particular country or locality.

A. Some Key Points to Bear in Mind

1. The best shape and form of agricultural modernization depends on what you ultimately want to accomplish. If the dominant concern is making cheaper food available or competing in world trade, emphasis might appropriately be on

---

*For presentation and discussion at the AID/USDA Agricultural policy Seminar. Washington,D.C. August 1971.

maximum gains in production efficiency through technical innovation, skilled management, and larger scales of operation. Government assistance programs would tend to be concentrated on the agricultural zones and commercial farm groups which have greatest potentials for further increases in productivity, favorable location, and progressive attitudes.

However, other development goals often become important constraints. There may be concern that new production systems not be encouraged to the extent that this reduces opportunities for campesinos to operate their own holdings, or for hired labor to find jobs in agriculture.

The desire may be to help campesinos in outlying rural areas to improve their agriculture as a means of raising income levels or reducing migration to the cities, even though their potential efficiency or contribution to total output may be quite limited. Or, if agricultural modernization involves drains on foreign exchange for imports of fertilizer, equipment, or other inputs, it may be felt that the benefits are not worth the cost.

These kinds of restraints often, but not always, entail some sacrifice of gains in overall agricultural production efficiency. Policymakers may have difficult choices to make about how far to go in honoring these other goals and constraints when mapping out the path for a modernized agriculture.

2. Laws, plans, and funds in themselves do nothing. Such actions merely set the stage for transforming traditional farming into a progressive, dynamic system, or for steering commercial agriculture in new directions. The changes that are induced by government legislation and investment will depend on (a) the effectiveness with which these intended actions are translated into useful programs and, in turn, (b) the effects that these programs have on the behavior of individual campesinos, hacendados, and others at whom the programs are addressed.

In other words, there may be much "slippage" between the policy-formation stage and final changes brought about.

People in agriculture cannot be expected to make changes that are consistent with national development objectives, unless three conditions are met:

a. They must be aware that these changes are possible and that new ways of doing things exist.

b. They must be capable of making these changes. This entails not only technical knowledge, but a host of other needs--adequate capital, access to markets, availability of needed inputs, suitable soil and water resources, etc.

c. They must be motivated. Price levels and effects on producers' incomes may not be the whole story. A proposed change could still be unattractive to a producer because of increased risk of financial loss, or its making him more dependent on the actions of others, or even social attitudes against departing from traditional patterns.

3. Agricultural modernization is a continuing, ever-changing process. It is not simply a matter of getting farmers to accept a new set of production practices and then moving on the next year to other places or problems. Continuing assistance over an extended period of time may be needed either to help bring the majority of producers to new heights or to enable them to sustain this new level of achievement. The problems that need priority attention at early stages may be different from those later on. Moreover, agricultural practices and systems that are appropriate today may not be tomorrow--product demands and resource limitations are continually changing...there will be competitive pressures for development and rapid adoption of even better technology...

national needs and policy objectives related to agriculture may not be the same.

In this light, agricultural modernization endeavors can be viewed as providing producers with a launching pad and rocket fuel for a new trajectory of progress, with provision for later changes in orbital patterns. The initial task is to get off the ground--away from traditional farming--without worrying too much about refinements. Later, refueling and orbital fine-tuning become very important.

This implies several things for strategies to create and maintain an efficient agriculture. For such programs as extension and credit, it means careful analysis of the specific kind and duration of help needed by any farmer group. It means building flexibility into agricultural ministries and assistance programs to facilitate periodic changes in scope and emphasis. It means avoiding rigidities in the laws and institutions related to agriculture that impede producer responsiveness to future opportunities and needs--outmoded or excessive constraints on size of land holdings, water rights, land use, marketing practices, commodity transport, etc. It means paving the way for future advances through effective agricultural research and technical training programs. It means being ready to learn from experience and to modify or discontinue programs that are not productive or that have outlived their usefulness.

4. Special provision may be needed to help farmers absorb setbacks beyond their control. One dominant characteristic of agriculture is the extent to which outcomes can be beyond an individual's control; drought, floods, insect plagues, disease epidemics, family sickness and injury, unforeseen declines in market prices, and breakdown of trade agreements can all have serious impact on incomes and ability to continue farm operations. Farmers are often reluctant to make

innovative changes--even though they have the resources, knowledge, and expectations of high profits--because they risk serious financial repercussions if something goes wrong. This is especially true for campesinos in the first stages of modernizing, who typically have no savings and for whom day-to-day survival is a challenge.

This suggests the importance in many situations of taking steps to reduce the probability or consequences of such risks as an integral part of agricultural modernization strategy. Arrangements need to be made in advance for timely responses to contingencies, rather than waiting until afterwards to decide what to do.

The approaches followed may have either of two effects. Some actions can reduce the probability of severe loss in the first place--e.g., preventative vaccination of livestock, use of pesticides, irrigation to offset rainfall variation, family health programs, encouragement of diversified farming systems, and price stabilization schemes. Other actions have more to do with helping farm families to absorb the consequences of a setback or disaster--food and medical relief, emergency loans or grants, social insurance, crop insurance, jobs on public works, etc.

Of course, all this has a cost in terms of either additional taxes or detracting from other government programs; decisions have to be made about how far to go in providing farmers with protections against disaster.

5. Effective planning of agricultural modernization involves choosing among alternatives. Seldom does a government agency have the funds, facilities, or technical leadership to enable it to do everything at once. Greater attention to one problem or group of farmers often means curtailing or delaying attention to others. Priorities have to be established with respect to what to do and whom

to help. Choices have to be made among alternative ways to carry out a certain program so that agency resources are used with maximum efficiency.

Making such choices is a matter of predicting as best as one can what the actual results of each possible course of action are likely to be, and then comparing these in terms of program objectives and constraints. In judging any one proposal, one needs to ask: Could the resources that would be tied up in this line of action be used to greater advantage in other ways? This concept, which economists call the "opportunity cost principle", is simple and obvious, but often ignored.

This also carries implications for effective utilization of agricultural planners and staff analysts. Such groups are frequently asked to collect descriptive information about existing farming patterns. This may help to pinpoint problems and groups in need of special attention. But alone it provides no basis for comparing one proposal for modernization of agriculture in the future against another. The insights of agronomists, sociologists, economists, and other specialists need to be drawn upon, and realistic projections of future outcomes developed, using benefit-cost analysis or a similar framework to tie things together. The questions posed by officials and legislators in the first place have much to do with the usefulness of the information provided by staff analysts for policy decisions.

6. Attention to details can make the difference between program success and failure. We all have heard stories about efforts to modernize farming coming to little avail for lack of spare parts to repair tractors, or failure of fertilizer to arrive in time, or absence of facilities to store the increased production. Similarly, justifications of new action proposals are frequently built around what would happen if everything went smoothly, rather than realistically

allowing for "slippages" in both program management and the extent to which farmers respond.

In evaluating new proposals, it behooves policymakers and planners to pay attention to such details. For example, a program to consolidate fragmented parcels may look attractive on the surface. But when you start to think about all the complexities of getting campesinos to agree on the proposed land exchanges, it could be that keeping the land pattern as it is and using extension workers and funds instead to promote use of hybrid seed and fertilizer will result in greater net accomplishment.

7. Don't forget the "unsung heroes" of agricultural progress. It is very tempting for political leaders and assistance agencies to want to concentrate their efforts and funds on programs that are highly visible and are directly related to dynamic changes in agriculture--new dams and irrigation schemes, land settlement projects, development of high-yielding varieties, central marketing facilities, pilot extension and supervised credit projects, etc. But the gains made through such actions and investments can be easily undermined if there is not parallel attention to establishment or improvement of the more pedestrian routine services needed to reinforce a progressive agriculture. These include such functions as enforcement of grades and standards, tax administration, market information, collection of agricultural statistics, weather forecasting, seed certification, regulation of water use, animal health services, soil testing, land classification, land title registration, and training of agricultural technicians. As major steps are taken to modernize a nation's agriculture, careful planning and phasing of such complementary services are needed. And, although they may seemingly be routine in character, these can become very positive and low-cost instruments for enhancing and accelerating progress.

8. There are no universal answers. In designing agricultural modernization strategies, two extremes ought to be avoided; it is a mistake either (a) to adopt blindly and in toto technical innovations or development approaches that have been successful elsewhere, or (b) to regard your situation as always being completely "different", with nothing to be learned from experience and research in other places.

Scientific advances in the U. S., other countries, and international research centers provide an invaluable wealth of insight and material that developing nations can consider as possibilities for local adaptation. For each country separately to do all the basic research and refinement needed for modern farming would represent vast inefficiency and duplication of effort. But the innovations and techniques that are most feasible and acceptable will differ from place to place, depending on the particular agronomic features, economic relationships, institutional constraints, and development objectives. Localized testing, modification, and socio-economic analysis are important links in this selection and adaptation process.

The same is true for design of strategies and programs to induce crop and livestock producers to modernize. Imbedded in others' efforts to do this, one is likely to discover many useful and innovative ideas. These, with perhaps some changes, may suggest appropriate building blocks with which to construct a cohesive effort to transform agriculture. But the final blend that is optimum will seldom be an exact duplicate of an overall program existing elsewhere.

9. Agricultural modernization is more than new varieties, irrigation projects, or extension workers. This is true in two senses. As agriculture moves from a traditional, subsistence-oriented pattern, it becomes increasingly interdependent with other sectors and places. Policies quite far removed from farming

itself--transportation systems, price stabilization, international agreements, taxation, industrial development, etc.--take on very important roles in setting the stage for a progressive agriculture.

Secondly, no amount of natural resource assets, funding, or new technology will result in agriculture moving forward unless along with these there is a "certain something" in the minds and hearts of producers, agency personnel, and leaders. This has to do with the will to change...a spirit of innovativeness... the determination to find ways to solve problems despite apparent obstacles... willingness to make some personal sacrifices in the interest of worthwhile achievement. Some studies have attempted to explain why one country or locality has had a progressive agriculture, while others with apparently similar circumstances have not; the difference often seems to come down to the inspiration, ingenuity, and perseverance generated by a particular group or individual. Constructive, realistic stimulation of this kind may well be one of the most important contributions that agricultural leaders and public officials can make.

B. An Illustrative Problem of Program Choice and Design

To bring these points together, let me pose an illustrative agricultural modernization problem and suggest some of the key questions that policymakers would do well to ask and seek further information about, if effective actions are to be taken.

Suppose that you are on an advisory committee to the Minister of Agriculture in a food-deficit country. There is strong pressure for the government to produce more food grains to enable low-income people to have better diets at reasonable cost, and at the same time reduce drains on foreign exchange for food imports. It is proposed that more of the Ministry's funds and personnel be concentrated on an intensive "wheat production campaign". This would

be directed at the larger farmers in a rainfed area that already produces food grains but that has been very unprogressive. The campaign would include three activities--intensified extension work to promote the adoption of new wheat varieties and other improved practices; production credit; and government distribution of seed, fertilizer, and pesticides at subsidized rates.

If your committee is asked to assess this proposal, several questions and informational needs come immediately to mind:

...Is wheat the best enterprise to promote? Are there other crops or livestock products that offer greater potentials in terms of (a) taking advantage of farm resource potentials, (b) likely farmer response, and (c) meeting the nutritional needs, preferences, and purchasing power of low-income consumers? What are the future supply and demand prospects for wheat relative for other commodities?

...Is this the best place in which to concentrate the campaign? Or are there other zones or groups of producers who would be more responsive and have more potentials for increased wheat production?

...Are there any additional constraints in the minds of the people or national leaders that have to be taken into account? For example, is alleviating poverty and underemployment in rural areas a concern? If so, to what extent would concentration of the campaign on smaller farmers, instead of the larger farmers, reduce gains in wheat production?

...What will be sacrificed from other programs by diverting Ministry funds and personnel into this campaign?

...Are the proposed components of the campaign (extension, credit, input supply) really the most effective way to stimulate farmers to increase wheat production? What has prevented them from being more progressive

or producing more wheat in the past? Are all the proposed services needed? Are there some successful ideas from elsewhere that are worth adapting and trying out? Will the campaign result in new problems to be coped with, such as needs for more wheat storage and transportation facilities?

...Have the details received sufficient attention? Are there easier or less costly ways to handle the campaign? What happens after the first year or two; will a sustained effort be needed, or can the Ministry move on to other regions or problems? Does the Ministry really have the technical and logistical capacity--as well as genuine desire--to handle the campaign?

Additional questions of this sort could be raised at the levels of both broad strategy and mechanics. But hopefully these demonstrate a pattern of thought that should underlie the analysis and design of agricultural modernization efforts--the idea that, when considering any particular proposal, one needs to be alert for other alternatives that may be more effective...that the focus needs to be on what self-sustaining changes are actually likely to take place in the future as the result of a proposed action...that differences in goals, constraints, and human response may make the best answer for one situation different from that in another.

SOME HELPFUL REFERENCES

1. Raymond P. Christensen and others. How the United States Improved Its Agriculture. U. S. Department of Agriculture, E.R.S. Foreign-76, March 1964.

2. Max F. Millikan and David Hapgood. No Easy Harvest: The Dilemma of Agriculture in Underdeveloped Countries. Little, Brown and Company, Boston, Massachusetts, 1967.

3. A. T. Mosher. Getting Agriculture Moving. The Agricultural Development Council, New York, 1966. (Spanish version, "Como Hacer Avanzar la Agricultura," is available from UTEHA, Av. Universidad 767, Mexico 12, D.F. Training manual to go with this is also available.)

4. Rainer Schickele. Agrarian Revolution and Economic Progress. Praeger, New York, 1968.