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WHAT DO WE KNOW ABOUT AFRICAN AGRICULTURAL DEVELOPMENT?
THE ROLE OF EXTENSION PERFORMANCE REANALYZED

by

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ABSTRACT

This review of actual and potential agricultural extension performance highlights the complex interlinkages between agency characteristics, a faulty technological base, the larger bureaucratic environment, and the constraints imposed by increasingly negative "development" trends. It is based heavily upon East African experience, and attempts to explain the disappointing productivity of Africa's extension agencies. It argues that the above components are in Africa highly interrelated. A focus on any one component--say, food production or technology generation--is unlikely to be effective over the longer run. The paper gives three categories of recommendations: i) for reforming the overall administrative systems, ii) for increasing the productivity of the typical ministry of agriculture's extension services, and, iii) for more effective donor involvement. A start has already been made in the funding by donors of an increased volume of farming system research. But this is only the first component. To use farming system research results effectively, African agricultural agencies need to develop their capacity to handle technical information. They must also develop better procedures for managing field extension activities. At the same time the larger bureaucratic environment must be changed to become more supportive of the kinds of managerial behavior which will assist agricultural activities. The principal operational difficulties are that these changes require multiple interventions at several levels, and that current trends within African rural development are strongly adverse. The report pinpoints what needs to be done, but does not give an easy recipe describing how to get these reforms adopted in practice.

keywords: African agricultural development, extension organization, development administration, LDC managerial behavior, technology transfer, development trends

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WHAT DO WE KNOW ABOUT MANAGING AGRICULTURAL EXTENSION ?

THE AFRICAN EXPERIENCE REANALYZED

Preface

This paper is an up-date after seven years of an earlier attempt to explain why technology transfers have not worked as the solution to Africa's needs for rapid agricultural development. In mid-1976, I observed that for many African nations

the contemporary rural administration has reached a genuine state of crisis—a point where the ineffectiveness of major public services has become so obvious that it is difficult to justify further public investment in these sectors.¹

In the years since, the negative trends which were just becoming visible in 1976 have persisted and intensified. Indeed, a whole literature has sprung up among Africanists trying to explain, justify, or prescribe solutions for this evident impasse. The symptoms are clearly economic in nature. They are evidenced by the continent's failure to feed itself and by a continuing decline in per capita agricultural productivity—a trend capably analyzed by Carl Eicher, whose article on this subject is required preliminary reading.² Most authors also admit that while the symptoms are economic, their causes are rooted deeply in the managerial, administrative, cultural, and ecologic systems. Some blame the crisis on the system of international dependency, but this does not explain why Africa should have the greatest problems. The larger questions which economic analysis does not fully address concern the managerial implications of this failure. The main issues we shall review in exploring this problem are:

- 1) Why is the African record as a whole so disappointing?
- 2) Why haven't the many development institutions and agencies established since independence yielded the expected output?
- 3) Why hasn't the "green revolution" (HYVs) which seems to be solving Asia's food deficit problem been equally effective in Africa?
- 4) What potential is there for utilizing Africa's extension services more effectively to transfer technology and stimulate development?
- 5) What types of interventions should donors consider to forestall further deterioration in Africa's agricultural performance?

¹"The Transferability of the Western Management Tradition to the Non-Western Public Service Sectors," Philippine Journal of Public Administration, Vol. 20, no. 4 (1976), pp. 401-427.

²"Facing Up to Africa's Food Crisis," Foreign Affairs, Vol. 61, no. 1. (Fall 1982), pp. 151-174.

INTRODUCTION

This paper explores a set of interrelated policy issues, all focussed on the apparent need to accelerate agricultural development in Africa. To arrive at what I believe are sound recommendations has required attacking three widely-held premises about African rural development.

First, many observers see Africa's problems as the outcome of poor management. I try to show that this impression is at the same time superficially valid and yet fundamentally misleading. Africa suffers from rational decisions taken by good managers who are operating in impossible situations--a very different picture in terms of its policy implications.

Second, donors have become enamored in recent years with technology transfer as a potential solution for agricultural productivity problems. This notion was undoubtedly fostered by the apparent success of Asia's "miracle grains" or HYVs. If instead one accepts--as I shall argue--that there are at best only modest yield increases to be had in African agriculture, one is left with the conclusion there are no shortcuts to success. If the continent is to advance, Africa's existing institutions have got to become more effective in generating and adapting new technologies more suited to small farmers' needs.

Third, we must then deal with the fundamental issue of why Africa's public agencies have shown such low organizational productivity. Here the false image to be overcome is the narrow concept many US advisors have of "extension", equating it either with "training" or with "technology diffusion". If one examines the actual processes of rural development as they are taking place in Africa today, one sees many parallels to US farming at the turn of the century. In the initial stages of agrarian development, "agricultural extension" encompasses a bewildering variety of activities and functions. What is required is to get the whole system of existing institutions into effective interaction--a task traditional "extension" seldom addresses.

To present these ideas, I first discuss what has gone wrong in Africa generally before in Part II looking specifically at the actual and potential role of extension agencies in promoting technology transfers. Part III provides recommendations for regaining control over organizational productivity. The three parts can be used separately, but logically an understanding of the prospects for reform depends upon first comprehending Africa's general difficulties.

I. WHAT IS GOING WRONG IN AFRICAN DEVELOPMENT?

1. Current Trends in the Poorer LDCs

I will assume readers have access to any of several overviews of recent LDC performance; for Africa, the World Bank's 1981 review would make a good starting point.¹ Rather than using space to present the dismal descriptive statistics, let us instead highlight the emergent trends whose outcomes rural development programs must try to counteract.

1) The increasing capital intensity of modern industry. This, more than anything else, underlies the slow expansion of the wage sector and hence of local demand for the goods produced by the manufacturing sector. The "success" stories beloved by Western analysts tend to be nations like Taiwan, Singapore, or Israel which rely heavily upon exports to developed nations for their products and ones whose populations exhibit high levels of skill and motivation. For the rest, the hope of rapidly industrializing a traditional sector to create jobs is just not taking place and becomes less and less likely as industry itself becomes larger scale. It is this trend which has given momentum to "appropriate technology", a compensatory tactic which forces planners to give greater priority to the employment aspects of investment policy. In any case, the consequence for the rural sector is that it must continue to support a large peri-urban population which cannot be fully employed in the modern wage economy.

2) Unforeseen consequences of the lumpiness of economic investments. In part because of the capital intensity of industry, in part the lumpiness of other infrastructural investments (roads, ports, airlines), but also compounded by political determination to press ahead on all fronts, we see country after country which having started well then enters upon deficit financing, a growing debt burden, and general inflation. The cycle has repeated itself often enough that we must recognize it arises from more than simply bad management. Whenever countries get ambitious about development--irrespective of whether they are capitalist-oriented or socialist-oriented--it seems the pressures to become overextended are almost irresistible. This situation (which is shared by countries as different in ideology as Nigeria, Zaire and Tanzania) then triggers off a whole set of further problems such as overvalued currency, uncontrolled urbanization, debt defaulting, corruption, etc.

3) Delayed project output from poor implementation. One reason for the foregoing problem arises because in a majority of LDC agricultural projects, actual performance lags considerably behind projected output. When this occurs, all other linkages are thrown out of kilter. Furthermore, such delays when aggregated across the entire agricultural sector mean that resources are being expended without generating commensurate output. Thus loans don't get repaid, high level manpower become accustomed to claiming fictional results, etc., etc. The agreement that implementation is the stage where problems really begin is nearly universal. But outsiders often fail to ask why this should be so. The reasons are complex, interconnected, and typical of the whole system of rural development: i) reliance upon unrealistic schedules in preliminary planning; ii) difficulties reflecting fundamental weaknesses in the planning itself; iii) the implementation phase is the first point where local capacity enters the process; iv) effects of high staff turnover; v) effects of poor support; etc.

¹Accelerated Development in Sub-Saharan Africa. An Agenda for ACTION.
Washington, D.C.: The World Bank, 1981, 198 pp.

4) Spread of public services in advance of commercialized farming. Given mass media and 20th century expectations about governmental responsibility, all citizens increasingly expect to have access to police protection, health facilities, and schools. Most will also be served these days by salaried extension staff, publically maintained roads, railways, and power lines. These are quite simply the sine qua non of modern civic life; those regimes which fail to extend such benefits must rely upon repression and chicanery to stay in power.

Nevertheless, if these services precede agricultural modernization we soon find that while poor peasants consume public services, such a small fraction of their real income enters the exchange system that there is simply no feasible way for them to pay for the services they use. Indeed, even well-intentioned efforts to extract revenue from peasant communities by tolerable means--in Africa, customarily this has been accomplished by cesses and duties levied against "cash crops"--then add to the problem. Such taxation devices further depress rural incomes, strengthening family reliance upon subsistence production and often driving the more entrepreneurial farmers out of export crop production and into "black market" crops which cannot be taxed by the state.

5) Bureaucratization of existing rural services. Accentuating the foregoing tendencies is the parallel trend towards replacing existing small-scale and usually part-time services (bush schools, local market masters, traditional mid-wives, etc.) by full time salaried staff who see themselves as part of large bureaucratic organizations. This trend is central to the contemporary spirit of modern life, both in America and in other industrial nations. It cross-cuts private and public sectors, being a matter of scale of operations rather than economic ideology. As a consequence, almost the first step an LDC government considers when "modernizing" rural development is to move toward supposedly more efficient organizational models: i.e. to superimpose upon small-scale local activities models derived from mass organizations. Invariably this means building offices, hiring staff, acquiring transport, creating supervisors, applying for loans and all the other normal accoutrements of "top-down" rural development. However, such measures are extremely expensive when the activities being dealt with are variable, small volume, and sporadic in occurrence. It is no accident, therefore, that governments look to donor funding as the means to enable them to extend such services into an apparently unresponsive countryside!

6) Fragmentation of responsibilities for rural development. In order for successful agricultural development to occur, some way must be found to get the various technical functions (research, input supply, credit, extension, crop protection, etc.) to intermesh in a routine and effective fashion. This requirement is so basic that many LDCs have turned to newly created vertical agencies--a tea or tobacco authority, for example--to put responsibility for all necessary functions under a single parent organization. But this solution to the need for close coordination has generated its own problems--see our discussion below of "parastatalism"--and in any case is not appropriate for lower value annual crops like maize or rice.

What we see happening is that as LDCs establish the full panoply of specialized service institutions, after a time the overall matrix becomes too complex for any one authority to coordinate. Each agency develops its own constituency, methods, and special interests. Each small unit does what it can in a limited way, while hoping somehow the total effort will be adequate. But meanwhile the overall responsibility for acting has become split between so many different units that in practice combined action does not occur.

7) Uncontrolled growth of parastatals. The parastatal structure—in the USA called a 'public corporation' and in Britain a 'quango' (for quasi-governmental organization)—seems to offer many advantages: a freedom from stifling civil service routines, retention of public control, specification of objectives by legal charter, creation of incentives and a career structure competitive with that of private industry, etc. The parastatal format has been proven almost infinitely adaptable, becoming in turn the basis for universities, research institutes, public utilities, river basin authorities, state ranches, harbors corporations, airlines, and so forth. Consequently the 1970s saw an enormous upsurge in the number of new parastatals being created throughout the LDCs as well as in industrial nations.

In LDC contexts, the rapid growth in numbers and size of parastatals has generated its own, second-generation problems. Typically, these include:

- rapid expansion exceeding the supply of skilled managers and staff.
- political criteria in selection of staff leading to low productivity.
- heavy investments in plant and equipment predicated on realizing major economies of scale which do not in actual fact materialize.
- failures to maintain and increase the supply of necessary inputs or of other linkages so that capacity remains idle for much of the time.
- high and rising overhead costs, in part to repay overoptimistic external loans.
- accentuation of a debilitating internal dichotomy between older, experienced workers and young, highly educated but inexperienced managers.
- draining off of key staff from the public service sectors.
- creation of a powerful interest group without adequate incentives to realize cost-effective operation.

For all these problems, the parastatal represents such a convenient solution to basic political dilemmas that we can expect the current trend to continue. The parastatal is here to stay on the international scene. However, it is not a form of corporate structure which either free market economists from the USA or Marxist writers from the socialist tradition are comfortable with. Thus despite the huge size of the emergent parastatal sector, the literature analyzing such agencies is often derivative and does not deal directly with typical parastatal problems.

8) Emergence of an international parallel economy. In a surprisingly large part of the world the 1970s saw the emergence of a full-blown parallel or "black-market" exchange economy. This has now reached a size where individual farmers have a strong incentive in many countries to evade the formal system altogether. Such a situation exists for many Latin American peasants feeding the enormous US drug trade; for virtually the entire private sector of many small Caribbean islands (whose de facto financial capital has become Miami); for the whole network of Sahelian states with trans-Sahara smuggling of European goods and rapid movement of foodgrains from one country to the next; for a whole cluster of East and Central African states where the collapse of civic order in Uganda made feasible the direct barter trade of coffee for external goods; and for a variety of commodities and peoples in SE Asia, though here I lack knowledge whether the parallel economy is growing as rapidly as it is in Africa and Latin America. The interesting point is that hardly anything is known about the institutional mechanisms and the actual size of such trading: but we do know that it is in some instances very large indeed.

8) parallel economy, cont.:

US commentators are generally somewhat smug about this phenomenon, seeing it as a healthy corrective to the over-controlled formal economy of many LDCs. The flaw comes in not realizing that a parallel market takes on a very different character: a) where incomes cannot be easily taxed, so that profits are not accessible to the state, b) where it directly diminishes the nation's access to foreign exchange, and, c) where it becomes international and even regional in character. Of course, these three conditions apply to most of the situations we have just characterized: for the affected states, the emergence of a vigorous parallel market is an extremely serious development.

The first and immediate effect is to deny producer services the financial base required for their operation. A second effect is often to divert production out of controlled export crops which the country relies upon for its exchange earnings. This is an extremely serious consequence compounded by (in some instances) the already weakening terms of trade and the fact that it occurs at just the stage where such earnings are vital for buying feedstocks and spare parts for the infant industries being established. But the third effect may be ultimately the most serious: a parallel economy eventually undermines the honesty, morale, and reliability of the whole public administration. Yet it is these very qualities which other remedies to mismanagement depend upon most, so that when reform is attempted the prior existence of a parallel economy foredooms it to failure. And, finally, an international parallel market often becomes the source of great political strains between participating nations—e.g. the US government's problems in Latin America or Nigeria's with its Sahalian neighbours. Internally, it also means that the usual corrective measures which could be applied to the economy itself may still not work because the demand is external to the local system.

9) Dangers of transition into commercialized production. In the last decade, analytical insights have been developed which explain why the transition of peasants into commercialized farming can yield such radically disparate outcomes. Under subsistence farming, peasants often received access to credit, inputs, and emergency relief on a reciprocal basis—meaning that by astute season-to-season management an individual could establish claims for help against unforeseen needs. Reciprocal exchange of economic resources reinforces villagers' social institutions (Hayami & Kikuchi 1982). It is a highly flexible mechanism for coping with adversity, in this respect probably superior to the alternative of market-based, cost-covering commercial service

When beginning to produce for cash, farmers must convert the network of reciprocal claims which traditionally served as their cushion against adversity into contractual, market-priced obligations. Because the two forms of exchange (reciprocal vs. market) are parallel alternatives, recognized guidelines for arranging this transition usually do not exist. Peasants who may have been relatively secure under a traditional system can find themselves divested of land and livelihood in a single season, once they accept credit from banks against the collateral of newly-granted land titles. Alternatively, a few larger farmers may buy up their neighbours' land at the bargain prices which were communally enforced under usufruct tenure. In short, relatively minor accidents of timing and strategic entrepreneurship can permanently affect the subsequent opportunities peasants will enjoy once the transition has taken place. We also know from actual case studies (such as Pelto's of Lapplander herders and Critchfield's of Punjab wheat farmers) that the transition between the two forms of exchange can occur with stunning rapidity.

9) commercialized production, cont.:

From a national policy standpoint, the danger is that under "spontaneous" market forces a major segment of the rural population may become dispossessed in a relatively short period of time--e.g. the former black sharecroppers who became Northern welfare recipients after the 1945-55 mechanization of US southern farming. The welfare burden is a permanent one, which an agrarian LDC with a slowly growing industrial sector can ill afford to absorb. Because western-trained economists assume increases in farm size generate increases in agricultural productivity, and because they see commercialization as a functional necessity preceding 'modernization', they have remained blind to the peculiar dangers which accompany the transition phase. Nonetheless, LDCs have every reason to pay close attention to this phase in a search for policies which can minimize the unexpected social costs which may otherwise quickly materialize.

10) Educationally-generated stresses. The 1970s also saw the emergence of educationally-generated pressures in many LDCs (Dore 1976). Once again, we face a 'tragedy-of-the-commons' situation wherein private benefits encourage actions that no longer give commensurate public benefits (here see Todaro 1981:306). Many LDCs--particularly in Africa--reacted to the manpower shortages at independence by heavy investment in publically-funded general education and dramatic expansion in higher education. This growth occurred in a context where people feel the government has an obligation to employ the graduates of its own training programs. Once set in motion, the three-way linkage between expanded general education, higher education, and more government employment becomes self-perpetuating. Western economic advisors in the human resources field tend to see 'stocks' of 'high level manpower' as investments in human 'capital'. For the most part, they have failed to warn of the systemic consequences which occur once educational expansion becomes a self-perpetuating cycle.

It is now apparent, however, that once these linkages are activated within a national system it is extremely difficult to withdraw. At each stage the accelerating manpower flows trigger demands for still more expansion further down the sequence. Given the additional reasons for establishing parastatals (reviewed already), there will always be an apparent unmet 'high level manpower' shortage to justify further investments. Of course, most of this economic activity remains salaried public employment of a non cost-recovering nature: bureaus, institutes, public corporations, technical colleges, and the like. The actual volume of LDC monetized production and trade simply cannot support an "infrastructure" of such size and apparent power. Yet because those getting the benefits are the nation's elite, often closely allied to the existing political leadership, any remedial actions would be very expensive politically. And the leaders themselves are trapped by their own vision of what "modernity" and "efficiency" require.

11) Capital-intensive militarization. Another feature of the past two decades has been the evolution of military technology, on one hand providing cheaper methods for interpersonal destruction but also more effective but vastly more expensive armaments (tanks, aircraft, etc.). From either standpoint, if one group acquires these weapons any potential objects of this firepower must do likewise if they perceive it at all likely they may be attacked.

11) militarization, cont.:

Often the cost of such armament is artificially low, since the major powers have been willing to underwrite the R & D investments as a public expense justified by their own "defence needs". Similarly, the ideology of "national interest" encourages larger powers to seek allies among the LDCs, to whom they sell armaments at subsidized interest rates. Once more, this sets up a 'tragedy-of-the-commons': individual LDCs acting in purely rational self-interest are forced to acquire expensive weapons which then all their neighbours must also purchase. The weapons themselves vastly exceed in delivery capability the amount of force which the typical LDC needed initially.

The aggregate effect of these acquisitions over time in a given LDC is to divert scarce foreign exchange from productive purposes, to create a new class of military bureaucrats (who then become a powerful interest group seeking still further "improvements" in weaponry), and to greatly strengthen a regime's capacities for internal repression. Pre-existing tensions between nations tend to be re-interpreted ideologically to gain great power backing, and hence subsidized financial and managerial support for weapons' acquisition. The tragedy—for indeed it is a major tragedy—is that this particular investment spiral duplicates and reinforces the non-productive public agency spiral we have just discussed. The last thing which LDCs needed at this juncture was to have yet another excuse for unproductive investments which sop up high level manpower and scarce foreign exchange.

2. Influence on the Context of Policy Choice

A common property within many of the above trends is that they embody a structural situation wherein the collective trend of individually rational decisions points in an undesired and unperceived direction. A key attribute of unwanted 'externalities' is often that the ultimate costs to the system are not clearly visible in the proximate contexts where decisions are being taken. This is why such trends are so difficult to counteract, and why corrective action will be ultimately of a political or regulatory nature. At least with benefit of two decades' experience some of the longer run effects can be identified.

1) The emergent LDC revenue/expenditure squeeze. Any LDC leader will tell you these days a principal problem is that government finances are simply insufficient. Instead of attributing such opinions to poor financial discipline or bad budgetting, we should note that several of our trends have the effect either of pushing public sector financial needs upwards or of making revenue harder to generate (Table 1 overleaf). Without repeating these arguments, let us simply recognize that the LDC revenue/expenditure squeeze is severe and growing worse. Present distortions in performance which are based on this economic situation are bound to intensify, creating a whole family of second generation difficulties (inflation, etc.). Since both sets of causal factors are cumulative, it is easy to underestimate the rate of divergence as it occurs.

Table 1. The LDC Revenue/Cost Squeeze

| Factors Lowering Farmers' Contributions to Development Finance: | Factors Increasing Governments' Needs for Development Finance: |
|--|--|
| 1. High population growth on fixed land means diminishing per capita income | 1. Expansion of basic welfare services to match population growth |
| 2. Increased population leads to decreased fallow, exhaustion of soil, and shortages of energy | 2. Increased capital intensity of industry requires larger share of overall investment |
| 3. Resultant monetization of water, energy and land squeezes disposable income even in subsistence production | 3. Large output of school leavers who cannot be absorbed into wage employment in the private sector and look to public employment |
| 4. Shift to commercial crops and monocropping makes families more vulnerable to famine in bad years | 4. Big lumpy investments in roads & power networks cannot pay off in early years |
| 5. Evasion of formal marketing channels because of high marketing costs in the formal sector with its controlled prices & large bureaucracy | 5. Shift from part-time multi-functional aid to full-time salaried staff in offering rural production services |
| 6. Low producer prices discourage production of crops which have greatest potential urban demand | 6. Attempt to subsidize basic food costs of the politically organized urban sector |
| 7. Increased unreliability of input supplies and support decreases farmers' willingness to take the greater risks inherent in commercial crops | 7. Attempt to subsidize inputs made available to marginal subsistence cultivators who are not yet in the commercial economy |
| 8. Perceived widening of class differences between rural and urban sectors decreases farmers' willingness to pay taxes | 8. Attempt to subsidize credit often has effect of helping elite groups who could probably afford it anyway |
| 9. Sometimes increased debt burdens related to land litigation, purchased seed & inputs, etc. leaves farmers' with less disposable income | 9. Declining terms of trade may necessitate greater exports to finance the same levels of fuel, parts, and feedstocks for industry |
| 10. Increased instability & decreased security may depress farmers' willingness to invest | 10. Increased international conflict/disasters may generate dependent refugee populations |
| 11. Increased expectation that basic services such as schooling, water supply & clinics should be supplied without charge to families | 11. Huge increase in costs of modern armaments dependent upon neighbour's investment in same |
| 12. Reversion to subsistence production as source of family incomes removes cash flow from community | 12. Delays in realizing output from investments leads to an increasing debt and interest costs |

2) Politicization of technical functions in resource starved systems. An area where developed nation experience transfers poorly is in regard to the operation of political systems under conditions of acute resource scarcity. Weiner's analysis of Indian politics (1962) is a classic which can be read with profit by anyone working within the LDCs. Weiner argued that where resources are very thinly spread, party politics inevitably become interest group politics at a very early stage in the political process, particularly under conditions of multi-party competition. His predictions are amply supported from the African post-independence trends, where in case after case an initial situation of "democratic" multi-party competition has rapidly degenerated into distributional squabbling between rival ethnic groups. As a consequence, almost universally in Africa national political leaders find themselves resorting to "one party" rule in an attempt to dampen down the rivalries over division of the spoils. This trend manifests itself across the whole spectrum of ideologies and in fact has little to do with espoused political philosophy and a great deal to do with the day-to-day exigencies of political control.

We have here an explanation for a number of otherwise puzzling aspects of LDC politics. If resources are very scarce, one might predict:

- People will be preoccupied with distribution rather than production, just as Leonard argues African civil servants tend to (1977:173-194).
- There will be greater pressure to divert resources from one agency to another at the local level in response to immediate needs, and hence to have what we term "proximate" as contrasted to "systemic" rationality.
- Political leaders will avoid commitments to specific objectives, since these make it possible to determine where limited benefits will be received and hence become a political liability.
- There will be frequent resort to strategies which externalize costs, in the short run allowing resource-starved activities to continue but in the long run generating many unanticipated consequences.
- It will be tempting to add extra objectives (often of a welfare nature) to existing activities, which in turn will render these activities more subject to short-term political pressure (the 'conflicting standards' argument).
- Leaders may impose standard solutions upon technical agencies, since by giving all areas equal treatment the scope for corruption or for argument over the distribution of resources is minimized.
- Locational decisions which carry with them implicit distributional implications (jobs, fall-out benefits, etc.) will become politicized.
- There will be tremendous pressure to spread resources thinly over as wide a territory as possible, though this may destroy the effectiveness of those services which require complementary inputs for their success (the "threshold effect").

The above predictions are not mutually exclusive. Once again, we find that we are dealing with an inter-connected system which tends to push decisions in a particular direction. The cumulative effect will give political rationality a divergent thrust from technical rationality. Perhaps this explains why technicians so often see political influence in LDCs as being a detrimental and obstructive factor.

3) Decreasing responsiveness to policy initiatives. For donors and LDC leaders alike, the 1965-75 decade was an especially heady time when countries were creating many new institutions and effective rural development seemed just around the corner. It was insufficiently realized (then as now) that this was a transitional period, different from earlier and later phases because the two systems (international and indigenous) which overlapped were under minimal constraints and both wanted to strike out in new directions. We didn't realize that this abrogation of local constraints would be temporary, a "grace period" which existed because the national leaders were new and traditional vested interests disorganized.

In the second decade after independence, LDCs now find that the new institutions they created have taken root--deep root! The many bureaucratic agencies have become special interest groups fighting for their own benefits (the problem Mao tried to cure with his 'cultural revolution'). No longer can decisions about educational structures and organizational design be reached on the basis of abstract merit. Present structures have become permanent. Their limitations are built into the system, and will be reflected in their output. When staff are rotated between jobs, they now bring with them an administrative culture which cannot be readily modified.

A second change concerns the weight of an emerging directionality within the overall system (our topic here). In the immediate post-independence period, policies were launched into a vacuum; interaction effects were few; and output depended mostly on the quality of planning and effort and so was predictable. That is no longer true. In LDCs the "new" agencies of the early 1960s are now traditional. Their output is constrained by larger trends, which unfortunately (for all the reasons we have enumerated) are strongly negative in impact. Well designed and needed policies which a decade ago could have been put into effect easily now require a tremendous supporting effort to achieve only minor improvements.

A third feature of the situation is generally not seen by western analysts because our systems are subject to more frequent political changes than are many LDCs. President Nyerere of Tanzania, for example, has overlapped in office Presidents Kennedy, Johnson, Nixon, Ford, Carter, and now Reagan. The handful of top officials around a man like Nyerere have in some cases held many different ministry portfolios. They have struggled with problems of development for twenty years without letup, have seen "crash program" after "crash program" come and go. These days the economic problems are escalating, so that a nation's cabinet may spend much of their time simply responding to IMF demands. The truth is that an LDC leadership can easily become diverted into day-to-day crisis management, oblivious to long-run trends or the need for fundamental solutions. Many senior officials have become fatigued, bone weary from having tried to implement too many programs with too few resources.

I suggest that as the interconnectivity between LDC problems grows, the usefulness of a 'policy analysis' focus diminishes. Decision-makers need instead systems analysis to tell them the origin and strength of adverse trends, to make apparent where trends and policies interact, and to identify points of leverage where new policies might tap existing momentum. This is not the kind of advice either donors or LDC leaders get, at least not from the economists who nowadays predominate among consultative staff and experts.

4) Emergence of distinctive LDC managerial styles. There is a lively debate going on between those who see LDC management as being basically the same as in DC organizations, and those (like myself) who insist it differs. Proponents of the universalistic viewpoint on management point out that LDC bureaucracies follow the same general model as do DC ones. They are strongly hierarchical, but that is not unique to LDCs. They have similar recruitment processes, organizational charts, supervisory methods, and budgeting techniques. If they differ, it is mainly because for obvious historical reasons they have too few good senior managers and too many undertrained junior staff. Rectify these two constraints (by more finance and training) and LDC organizations would be just as productive as our own.

These who see LDC management as being distinctive tend to emphasize the less visible aspects like motivation, decision-making, communication, discipline, and managerial culture. They also point out that while the components in bureaucracies may be broadly similar, the proportions between components may differ widely. But the principal evidence they cite comes from the routine operational difficulties which LDC organizations experience (Moris 1977):

- a bad fit between objectives and organizational capacities
- failure to honor commitments, frequent changes in plans
- high rates of staff transfer and turnover
- top staff overworked while bottom staff loaf
- lack of organizational pressure on individuals to accomplish goals
- large amount of energy required to accomplish routine tasks
- personalismo: necessity of getting personal interventions
- hub-and-wheel task delegation: overcentralized control by key people
- excessive political interventions in daily operations
- lack of cost sensitivity within internal operations
- inability to adhere to schedules
- unreliable technical and support services
- failure to repair or maintain equipment, high depreciation
- low morale of field staff
- deep social cleavages between categories of staff

Obviously, no one system will show all these faults. They are, however, commonly reported from many LDC administrative systems. They also represent types of weakness which, while not easily seen on a short visit, nevertheless over a longer period can greatly reduce organizational productivity. Since under LDC administration come ex-Spanish, ex-French, and ex-British systems, to the extent that these problems are shared they must arise out of situational commonalities and not historical connections. When I find similarities between Argentine and Tanzanian implementation, these cannot represent a diffusion of specific managerial culture.

More recent authors take a position mid-way between the two extremes. Kiggundu, Jorgensen and Hafsi (1983) review 94 sources to reach the conclusion that those which focus on the "technical core" of internal organizational operation find LDC units behaving like our own, while those looking at an organization's relationship to its environment see major differences. Gable and Springer warn (1979:700) that no simple characterization of "LDC management" will account for the specific national differences which they found influenced success in their four country review of rice program implementation. Instead, they emphasize, we must look at how programs relate to their immediate contexts if we wish to predict organizational behavior.

Since throughout this paper we return again and again to the issue of organizational productivity, the user deserves clear justification why so much space is devoted to a matter upon which experts do not fully agree. Why do I argue LDC organizational productivity is the central issue for explaining African difficulties generally and the limited potential for extension reform particularly?

- In any system, organizational productivity becomes a central question if tasks are difficult, if the outcome is especially important, if the organization is large or the resources required scarce, or if other interventions assume certain types of organizational capability. All five conditions apply in regard to our topic.
- There is widespread agreement among observers of rural development in Black Africa that weak organizational performance is here the crucial constraint (Howells 1979, Gould 1980, Price 1975).
- In economies dominated by public enterprises, there is no large and efficient private sector to substitute for shortfalls in public agency performance. If public agencies falter, so does the entire economy. This is in fact the situation in a majority of the black African states.
- The most commonly seen weaknesses in LDC management turn out to be of a nature which strongly affects technical programs like those in agriculture or medicine. To be effective, agricultural services must be flexible, on time, responsive, and coordinated. If these are the weak functions within the administrative system, any agricultural service delivery system will be greatly hampered.
- Unfortunately, these same weaknesses typically become more pronounced as one moves outwards from the center and downwards from the provincial office towards the village. For the contact agents in the agricultural extension services, these are very real problems indeed.
- The kinds of organizational breakdown one encounters in the field are very pervasive but difficult to document from reports originating in the head office (usually located in the capital city). They seem to arise in the process of day-to-day administration, and to be getting more severe as time goes on.
- Since the African countries showing this syndrome of escalating organizational difficulties are not closely related by history, culture, or ideology, there must be situational commonalities which are the root causes of their functional weaknesses.

3. Why Is Africa the Problem?

The adverse trends we have just described can be found in many LDCs. From a theoretical viewpoint there is little to distinguish between, say, Guyana, Ghana, or Burmah. How then should we explain the continuing weakness of economic performance in the black African states, particularly in the years since 1975?

1) First, while it is true that the trends reviewed above are world-wide, they find heightened expression in sub-Saharan Africa. A good number of the poorer African states are at the moment grappling with all these difficulties--and doing so against a background of depressed commodity prices and major ecological or political upheavals. As Africa militarizes, the flow of refugees between states is increasing--and yet these are desperately poor nations not even keeping abreast of their own food needs. If as has been argued these trends are interactive, it should be anticipated that their impact will be especially virulent in black Africa.

But why were the negative consequences not evident before 1975? Here it is relevant that many African states achieved independence in the 1960s; 1975 often marks about a decade of initial policy execution. Usually the colonial elite stayed on during the first few years, which, as it happened, coincided with a wetter period when primary product prices were strong. Then came the Sahelian and East African droughts of 1972-75, the escalating energy prices, weakening primary product prices, and several other adverse developments such as the wars in Uganda and Ethiopia. Also, most African states tried to maintain fixed currency exchange rates pegged to the franc, dollar, or pound. By the late 1970s a decade of internal inflation meant that the local currency had become grossly overvalued, acting as a de facto taxing device upon peasant producers of export crops. By this time, too, the effect of a politicization of the administrative cadres after Independence were becoming visible--a point to which we will return below.

2) A second distinguishing feature of sub-Saharan Africa is its ecological situation. Kamarck (1976) argues the general proposition that tropical environments impose a larger energy drain upon constituent farming systems. Once again, the factors he enumerates--rainfall and heat, leached soils, pests, diseases, parasites, and so forth--while pan-tropical reach their most heightened form in Africa. Many of the worst parasitic diseases known

to man--sleeping sickness, river blindness, schistosomiasis, elephantiasis, ascaris, helminthiasis, malaria, nematode infestations, leprosy, etc.--are concentrated in tropical Africa, and seem to accompany human settlement (Owen 1973). Plants suffer from a bewildering variety of blights, wilts, rusts, streak viruses, mosiacs, scales, aphids, leaf hoppers, and other conditions which depress productivity; introduced animals fare even worse. Working in African agriculture, one comes to appreciate just how fortunate temperate zone farmers are with their hardy cereal crops and reliable moisture regime. In Africa, the interactions are more complex, the lag-time before new diseases arise is shorter, the number of pests and weeds greater, and in sum total the margin between success and failure that much thinner. If we add in the constant pressure of heat stress and the greater unreliability of rainfall, we gain some appreciation of the crushing environmental burden which is an ever present reality in most parts of tropical Africa.¹ When we find the peasants thickly clustered on Africa's plateaus and volcanic highlands (which do not share all these disabilities), we should realize it is for good reason.

3) The third distinguishing feature of African states (at least in comparison to Latin America) is their recent liberation from colonial rule. African states achieved independence in circumstances which: (a) gave the leadership an inflated view of the efficacy of political means, (b) promoted a whole generation of young civil servants, who achieved office on the basis of education rather than experience (the encadrement phenomenon), (c) confirmed these leaders in their interpretation that the continent's weaknesses were principally of colonial origin, and, therefore, (d) raised popular expectations concerning what the new governments could offer. African leaders (excepting Malawi's Banda) usually see technical arguments favoring efficiency and restraint as holdovers from the "colonial mentality". Some African countries have seemed positively eager to dispossess the immigrant traders, bankers, farmers, and advisors who stayed on after Independence. More than elsewhere, African states emphasized rapid expansion of education at all levels. They have set high targets in a deliberate attempt to mobilize unconventional resources (whether voluntarily or not). In the process, they have often ignored "sound" economic advice--and seemingly averted the disasters their advisors were predicting. Throughout the 1970s in black Africa, politics came first.

¹Quantitative estimates of the magnitude of African environmental hazards are provided in the work of White, Kates, and others (White 1974).

4) A fourth distinguishing feature of Black Africa has been the extreme dualism of the economic systems. As Eicher points out, the African economies are small ones because of comparatively low populations (in contrast here to Asia). This intrinsic limitation is reinforced by the subsistence orientation of the farming sector, which is mainly composed of hand cultivators farming tiny acreages. African rural communities have insufficient cash flow to support the secondary and tertiary sectors, so almost the entire national market is concentrated within the enclave economy around the capital cities. Education and mass services have in Africa preceded the commercialization of indigenous farming. Thus when African leaders set ambitious welfare goals following independence, they were virtually guaranteeing that their states would suffer from a continuing fiscal crisis. Then, having realized their power base was the workers and salaried elite concentrated in the small but rapidly growing urban sector, most African leaders proceeded to impose price controls to protect urban consumers--thereby further depressing rural production. With such small volumes to tax, the rates of taxation assessed on the export crops have remained high, so high that many producers are abandoning the export crop sector. The combination of high rates of population growth in the subsistence economy coupled with high rates of protection for consumers in the monetized urban sector becomes another "vicious cycle" --easy to enter but very hard to leave. The lesson is, as Eicher sees it (1982:160): "A simple but powerful conclusion emerges from this experience--African states must overhaul the incentive structure for farmers and adopt increased farm income as an important goal of social policy in the 1980s." But even he recognizes the political difficulty of carrying out this eminently sound advice (1982:165):

Looking toward policy reform, a word of caution is in order. Food policy is every bit as delicate as family planning. The rice riots in Monrovia, which left more than 100 dead in 1979, and the sugar riots in Khartoum and other major cities in the Sudan...are reminders of the narrow range of options for policymakers on food policy issues.

5) The fifth factor is a nearly universal characteristic of African political systems: the multi-ethnic nature of the population coupled with uneven rates of colonial development and artificial national boundaries. Superimposed upon existing linguistic differences--a country like Zambia, for example, must try to produce all its primary school materials in 8-9 languages--are often major religious divisions separating Moslems from Christians, and Catholics from Protestants. Almost invariably certain groups (sometimes comparatively small tribes like the Chagga in Tanganyika)

took up education enthusiastically, and so were in a privileged position once the job market was thrown open after Independence. Then there is the pan-African problem of livestock keeping tribes, who often opposed education and frequently straddle national borders. Finally, we have various trading minorities--Lebanese and Hausa in West Africa; Indians, Pakistanis, Somalis, and Arabs in East Africa--who may not even hold citizenship in the countries where they reside. What all this means in day-to-day policy making is that almost any routine administrative decision can acquire loaded implications because of sensitivities towards its ethnic ramifications. African leaders are already too prone to favor distributional over production policies; ethnic polarization accentuates and rigidifies these tendencies into a permanent bias. In addition, where most middle-sized commercial firms are controlled by suspect minorities, few African leaders are going to turn towards the private sector to counterbalance or replace inefficient public sector institutions.

6) A sixth set of factors arise out of the emergent organizational environment. In many African countries the commercial sector is weak and internally polarized. The large firms are overseas trading companies from the former colonial metropole, these days sometimes being replaced by multinationals. Indigenous African companies are usually still miniscule operations managed by the original owner. The nearest thing to US style producer services were the Asian or Lebanese traders, but these have been gradually squeezed out of rural sector activity in the mistaken hope that their functions could be performed by co-operatives or the newly formed public corporations. To fill in for missing functions and to replace the departing minorities, African governments have established an enormous number of parastatal organizations. The commercial ones have often been given fairly large capacity, under the misplaced notion they would realize major economies of scale and so repay the extra investment. Instead, these organizations are typically inefficient and inflexible. The predominant managerial style has become one of "personalismo," so that personal interventions are required to get anything done. Public sector safeguards against dismissals of staff are also often adhered to. Because parastatal staff control many scarce goods and enjoy the best benefits, their jobs are highly sought after. Staff have become notoriously corrupt (though here the West African countries and Zaire are worse than the East and Southern African nations), with a consequent further deterioration in overall efficiency. Even so, the public sector remains predominant and its practices set the tenor for most organizations throughout the economy (for more detailed critiques see Moris 1976, Howells 1979, Gould 1980, and Price 1975).

7) The main production increases in African agriculture over the past two decades have arisen from expanding acreages and not increases in farm-level productivity (Anthony et al. 1979). There are several reasons. In the recent past, most technical change in African agriculture came through the introduction of higher value export crops such as tobacco, cotton, tea and coffee. These same crops absorbed most of the small amount of technical research which was being done in the 1960s and early 1970s. As a consequence there have been few other technical innovations to extend suited to small farmers' needs (Anthony et al. 1979:289). The prospects for irrigated farming are much less favorable in Africa than in Asia. Groundwater yields from tubewells are low, major rivers have few good storage sites, soils are often extremely variable, main system irrigation agencies have a poor record, farmers are inexperienced in water management, and there is little demand for crops near the most favorable sites. Without irrigation, many HYVs do not outperform local varieties and the returns to fertilizers become marginal if not outright negative. The other intensification measures recommended by the continent's research stations usually involve extra inputs of peasant labor-- which in Africa means unpriced female labor. Women's time is, however, already a constraining factor and most African peasants have been resistant to adopting such "improvements".

In Africa the traditional solution to declining yields was for families to migrate to the expanding agricultural frontier, a spontaneous process of land-use intensification which accelerated during the closing phases of colonial rule. It is significant that of the seven districts studied by the Stanford team, the three showing the highest innovation rates--Kisii in Kenya, Geita in Tanzania, and Mazabuka in Zambia--were all on either recently settled or re-settled land (Anthony et al. 1979:291). At an earlier time other districts like Teso (Uganda) or Akim-Abuakwa (Ghana) had also showed rapid improvement but as of 1967-68 were no longer doing so. At the farm level, too, authors have noted the cyclical and temporary nature of "progressive" farming: the richer farms in one generation tend to become fragmented and impoverished in the next (Van Donge 1982). Now that fresh land has become scarce, population pressure is forcing arable farmers to move down the gradient into the more marginal, semi-arid lands (Wisner & Mbiti 1974). The drought crises in Africa today are as much caused by the spread of high-risk farming into former pastoral lands as they are of overgrazing by the pastoralists (Franke & Chasin 1980, Bernard & Thom 1981).

4. Policy Implementation in Africa

1) A key aspect of the "Africa syndrome" is that while the various problems seem manageable in individual instances--provided that determined corrective actions would be taken--there is nobody placed to observe how these effects interact when similar difficulties arise across the entire sector. Frequently a problem which might be solved in isolation soon becomes entirely unmanageable when it recurs hundreds of times. Aggregate effects are by nature often invisible. Unless corrective actions are taken early, the true dimensions of an emerging crisis will not be appreciated until the situation is already out of control.

2) Several of these trends are also uni-directional in their impact. While arising from independent causes, their effects accelerate the common momentum which reinforces the negative consequences being generated from other, parallel trends. Such a causal network is especially dangerous, because once it becomes established it becomes impervious to the usual kinds of managerial intervention which are feasible in individual instances. Once the network has become interconnected and resonant, even when the right actions are taken in particular instances there will be other trends in the environment which continue to cause the unwanted effects and therefore nullify the corrective action. Over time, the polarity increases and the amount of effort needed to reverse the tendency soon exceeds the capacity of any one agency and eventually even of the political system as a whole. This managerial analogue of the economist's "pernicious cycles" is outlined in Appendix I, where it can be seen that many of the trends we have just outlined are strongly interactive in nature.

3) The fact we understand what causes such problems in the individual cases has tended to lull commentators into thinking if only LDCs followed our micro prescriptions, a return to a situation characterized by "virtuous cycles" could soon be realized.¹ Not so. While it is true we understand the individual mistakes that start the system off in a negative direction, we do not yet have a clear understanding of the interactions, nor do we have any idea how to reverse momentum in the system once things go really awry. What we can say is that most of the stock solutions--devaluation, decentralization, privatization, structural reorganization, better incentives, deregulation, etc.--cease to be effective once the negative aspects become interconnected to the degree that they are in many of the poorer LDCs.

¹This assumption is the principle weakness of the World Bank's agenda for action to resolve the African impasse, as contained in Accelerated Development in Sub-Saharan Africa (1981).

4) In retrospect, one can see that a number of the long-run causes of "bad" management in Africa have been the result of well-intended attempts to accelerate development in the short run. Several, indeed, consist of politically dictated responses to perceived economic imbalances--e.g. the premature and predominantly 'import substitution' nature of Africa's industrialization. Economic situations have been the root cause of many of Africa's ills, but they are not seen to be so by either African national leaders or external analysts. To local leaders, the need to break out of external dependency was imperative and not a matter for hesitant experimentation. Now matter how underutilized local industries are, having them is an improvement over being lectured by economists concerning the theory of comparative advantage while continuing to import leather shoes from Italy. By the same token, these inefficient and unreliable local enterprises furnish the visiting economist with abundant proof the policies themselves were ill chosen. Somehow the nexus between situation and policy escapes rational scrutiny under either side's viewpoint. To understand African development at all in the 1960s and 1970s, we must begin by recognizing that the actions which have been taken seemed rational in their immediate contexts. Often, in point of fact, Africa's policies were designed by external western consultants, e.g. the Mc Kinsey Company's pervasive influence upon the shape of Tanzania's development in the early 1970s.

5) This finding powerfully suggests that we have a repeating pattern of situations wherein the aggregate, reiterative effects of short-run policy choices are counter-productive to their intended impact. Such situations are always difficult to deal with politically in the short term, for the very reason that the long-run consequences are not clearly evident. In instance after instance, the solutions to Africa's ills have, paradoxically, contributed to the continent's current difficulties. A few of the many illustrations of this nature are:

- proliferation of districts to resolve local political conflicts
- "crash" short-term training to fill important new cadres
- attempts to double or triple capacity of successful projects
- expansion of benefits in parastatals to attract good staff
- expansion of training opportunities to "solve" youth unemployment

It would seem that the objective circumstances of African rural development have been such that again and again leaders have been drawn into sequences of small decisions which eventuate in a terminal situation nobody wanted

or anticipated. (Since this same tendency is also often found in free-market economies, we should not be too hasty to assume that market signals would perform this task more prudently.) In this situation, any mode of analysis which focusses attention upon immediate factors will risk making the situation worse, not better. Thus a commercial businessman, a project economist and a political leader would all be prone to make similar errors despite their different ideologies they might represent.

6) In place of the policy-oriented analysis one usually encounters, I therefore suggest what we need instead is process-oriented analysis. The mistakes being made are legion, potentially subject to an interminable barrage of specific criticisms--most of them quite valid. But that is not the point. What analysts have not been doing is to ask why are the same mistakes getting repeated? For example, in regard to our hypothesis above the significant question is in what circumstances might we predict the long run impacts may diverge from apparent immediate consequences of a given type of decision? Instead of classifying policies as "good" or "bad", we might then think of them as "dangerous" and "less dangerous".

Looking back upon the four years I spent inside the Tanzanian field administration, I can think of a number of typical administrative decisions which nevertheless from this standpoint might be classified as "dangerous"

- Crisis or ad hoc decisions (often taken by the political leadership when technical ministries have failed to resolve a problem) which ignore the causal factors but merely transfer the costs to some other locus in the system. In so doing, the causal situation is left undiagnosed and uncorrected.
- Actions which set in motion feedback loops which may eventually accentuate the very symptoms being dealt with.
- Allocations which while apparently necessary may be repeated by many other actors independently, so that major unforeseen aggregate constraints may emerge.
- Action sequences which follow one upon the other automatically but which lack the property of giving clearcut signals if things begin to go wrong.
- Policies which bring into being new but narrowly focussed interest groups, e.g. privileged professions or a bureaucratized military force.
- Actions whose beneficial effect depends upon other developments not under planned control.

Without making any attempt to be exhaustive in this listing, let me simply point out that such situations are neutral in regards to scale: if a project executive can make them, so also can the President of the nation. Here is how Ollawa describes rural development decision-making in Zambia (1978:82):

More often than not...policy issues and decisions focus primarily on dramatic short-run innovations to deal with immediate pressing problems rather than on long-range programs designed to tackle the various aspects of rural development. Perhaps the most important feature of this style of decision making can best be summarized in terms of what Hirschman has referred to as 'the motivation-outruns-understanding approach'. The peculiarity...is that certain major policies are usually promulgated without fully understanding or exploring in advance the probability of their implementation. Rather, the political decision is made first and publically announced, with the assumption that the desire to maximize the principle objective will help mobilize the requisite resources for its attainment.

Policy analysis might object that this is a bad method for reaching decisions; process-oriented analysis would ask instead why African presidents so commonly feel impelled to act in this way. The mistake is found in so many different countries and contexts that there must be underlying structural reasons why it occurs. Finding the root structural causes which underlie persistent operational weaknesses is, then, the place to start if we wish to understand why African development is going wrong.

7) Because organizational structures look pretty much the same the world over, analysts have been prone to assume they operate in the same ways too. However when the symptoms of organizational malfunctioning become widespread and persistent despite repeated changes in personnel and in policies, one must look beyond the individual manager to see if there are operational faults built into the system as a whole. Let us try to list some of these "process faults" which can occur anywhere:

- Monitoring faults: when the system operates without receiving signal cues, or doesn't correctly interpret them, or if it does fails to act.
- Bureaucratic territoriality: exaggerated concern over following 'official channels' and respecting the formal allocation of responsibilities even to the detriment of achieving agreed objectives.
- Design improbabilities: failure to seek out accurate information so that new programs/plans miss key features, incorporate unrealistic targets, or in other ways are bound to fail.

- Misdirected incentives: when incentives signals impinging upon the individual cause actions which run counter to organizational purposes.
- Role inhibitions: when incumbents to particular positions feel themselves unable to carry out their formal duties, e.g. because "wrong channels," "a political matter," "requires approval," etc.
- Inter-organizational matrix failures: tendency for breakdown of inter-agency scheduling, coordination, and cooperation; inability to agree easily on joint matters; inability to deliver reliably on agreements.
- Weak follow through: lessening or withdrawal of organizational support at the implementation stage, inability to maintain pressure on field staff to carry through planned activities to completion.
- Managerial/staff hemorrhage: continued losses of vital staff, damaging rates of staff turnover or movement between assignments.
- Unresolved technical tie-ups: major problems of a capacity or engineering nature which are left unresolved, and which continue to sabotage other operations.
- Disengagement failure: persisting with weak staff, the wrong policies, high cost operations, or other faults after their negative effect is recognized.
- Unrealistic targets: the deliberate adoption of "best ever", unrealistic or unworkable targets within routine decision-making (budgeting, etc.).
- Scheduling breakdown: when because of structured uncertainties individuals either cannot make or cannot adhere to agreed schedules.
- Layering blockages: when communications and action commitments can no longer be passed readily from one layer to the next internal to the organization.

Anyone working in a bureaucratic organization will recognize many of these, and will realize they are the kinds of bureaucratic weakness which the outsider cannot easily see on a single visit. Nevertheless they have a huge potential for destroying organizational productivity.

8) When, therefore, administrative analysts like Gable and Spring argue there is nothing generically uniform to set 'third world' systems apart, they are surely correct. Formal structures do not of themselves cause the operational difficulties we see on every side in Africa. Nor do all countries show the same weaknesses with the same intensities. The variables which distinguished Asian rice programs in the Gable and Springer study included (1979:690-700): 1) organizational structure, 2) administrative coordination, 3) degree of top-level support, 4) differing priorities assigned to agriculture, 5) quality of human resources, 6) degree of pressure put on personnel within their systems, 7) whether officials had an urban or rural background, 8) career opportunities within the service, 9) levels

vity in Africa is that individual managers are put in situations where their rational responses will nevertheless sabotage the attainment of larger collective goals.

The situations which trouble African administrators can be inferred from the trends listed earlier. They come in a bewildering variety, including incidents such as:

- Appointment of highly educated young men without experience to work over experienced older men with little higher education.
- Inability to fire junior staff even when negligent because they are related to higher officials or political authorities.
- Rates of annual inflation that run between 20 and 200%, but sometimes no allowance for inflation in project costings.
- Losses of key staff at critical junctures because they are going overseas for training, then not getting them back when they return.
- Almost all operational resources exhausted by staff salaries, so that field services must operate without sufficient recurrent funds, fuel, vehicles or equipment.
- Inability to make planned and announced field visits because at the last minute vehicles or fuel are not available.
- Equipment that is down for 6-12 months waiting for arrival of spare parts from overseas.
- Stealing of parts off new vehicles in transit so they arrive in unusable condition.
- Private builders who take 3-5 years to complete 1-2 year contracts because of unanticipated national shortages in materials.
- Budgetary requests that are routinely cut by arbitrary percentages so that one must always over-estimate future financial needs.
- Acute local scarcities, so that political intervention to save other still more necessary activities becomes commonplace.

Any manager with African field experience could expand a list like this to run for pages. The difficulties one would find on such a listing are these days common to virtually the whole of Africa, save perhaps Botswana and a few Francophone countries. There is nothing particularly Tanzanian, or Sudanese about such problems, nor are they distinguishable according to the ideological orientation of the ruling regime. If we are to generalize about trends, we might hazard a guess that capitalistic-oriented nations (Zaire, Nigeria) get into difficulties because of rampant corruption whereas socialist states do when attempting too much too soon, but the end systemic result will be remarkably similar. It is just the rates of deterioration that vary.

10) Our extended analysis into the causes of low administrative performance in Africa suggests several policy implications:

- For reasons not entirely clear, administrative malfunctioning seems to amplify the worst tendencies within the accompanying development ideology, e.g. in militaristic regimes it increases coercion; in capitalistic regimes, corruption; in top-down systems, bureaucratic rigidity; in socialist regimes, inefficiency.
- Since the causes of malfunctioning are not particular to any given ideological orientation, it is foolish to use this as the criterion for channelling technical assistance. It is also futile to do so.
- The severity of observed trends is increasing over time, but newly independent nations seem to enjoy an initial decade when rationally-chosen policies have the intended effects. They should thus try to learn from the others and avoid actions which accentuate systemic malfunctioning. So far, such learning has not taken place.
- Once systemic malfunctioning emerges across the entire agricultural sector, particular choices of policy have diminishing influence. In such situations, systemic tendencies must become the overriding concern in policy analysis.
- When systemic malfunctioning becomes entrenched, the main hope for improvement must rest on the identification of "process interventions" which will change how the system works (in contrast to structural interventions which change how it looks).
- Some of the standard bureaucratic reforms such as making individuals more accountable or giving more training to individual cadres may in the overall context simply make the malfunctioning worse.
- Because the problem of low organizational productivity cross-cuts the entire spectrum of national institutions, tactics which do work in one sector are likely to be useful in others as well.
- We should not expect that particular organizational forms--"the T & V system," "KTDA-type agencies," "package programs," etc.--will produce equal results in other national settings. It will be the quality of implementation rather than the program model which influences success.
- This means that the design of new policies and rural development programs requires extraordinary amounts of analytic skill and local sensitivity. When it comes to reforming situationally-generated malfunctioning without changing the situations themselves, there are few easy answers.
- On the international scene, we have neither much expertise nor a base of relevant research knowledge to guide in how "process interventions" can be found and applied. Present expertise is worse than useless; it in fact perpetuates the very problems LDCs need to escape.

11) For the sake of logical symmetry, let us briefly summarize the types of process interventions which are needed within African administrative systems. (These will reappear in greater detail in Part III of this paper.)

- At a minimum, African leaders can be urged to stop taking actions which are bound to make systemic functioning worse, e.g. huge investments in single projects which will absorb enormous amounts of foreign exchange, etc. The difficulty here is that the negative effects tend to be of an aggregate nature, not visibly connected to their real causes.
- Identification of the critical performance sectors--particularly shortfalls in either foreign exchange earnings or food production--where weak output directly affects many other decisions within the economy. Some kind of intelligence capability must be created to warn of impending difficulty earlier in the policy-review process, and also to insure that actions affecting the critical factors receive top priority.
- Rectify for missing signals within the national decision-making system. The main need is to insure that domains critical to national development are kept under continuous monitoring.
- Modulate the incentives to which administrative staff are responding in ways which will encourage the desired managerial behaviors. Of particular interest should be how people are recruited, posted (assigned), and promoted.
- Improve the budgetary procedures to take advantage of their leverage effects within the system, to unify investment and recurrent budgetary planning, and to shift pressure towards implementation rather than new projects.
- African states should also allow market mechanisms to do those things (like determine prices) which they do well. Private enterprise should be allowed to compete with and thus improve public corporate performance.
- Devise and institute methods for transfer price accounting which can be applied to internal agency activities. This would help to keep overhead costs under tighter control by charging for benefits where they are consumed rather than externalizing these costs into the general overhead.
- Direct a frontal attack on low productivity institutions. Here the focus would be to gain genuine benefit from the operation of major public agencies (like universities or railway systems) which are already funded by not performing well.
- Find ways to make routine administration less energy intensive insofar as demands on the time of middle and senior-level managers is concerned. Of particular importance is to begin to schedule activities reliably, so that the system's overall predictability improves.
- Create a sense of organizational excitement, a shared feeling among individuals that problems can be solved and that their personal contributions do make a difference.

5. Extension Implications

1) African governments cannot apparently count upon HYVs as an easy answer to their need to boost on-farm productivity. Likely increases from technical recommendations will be in the 20-50% range, rather than the 100-200% where innovations will sell themselves. When added output is, say, only 20-25% above current productivity, careful feasibility testing is essential since slight changes in input pricing or comparative attractiveness may erode an innovation's apparent advantage. Organized extension work is also more critical when the benefits of adoption are modest. So also in regard to irrigation: large gains cannot be expected.

2) African peasant producers have quickly responded to higher prices and new economic opportunities. The continent does not yet have the entrenched landlord classes one finds in Asia and Latin America. There are, however, large and unexplained differences at the local level in on-farm productivity (which does not seem associated with farm size). When rural areas display such a wide range in farming efficiencies, the aim of the extension services should be to bring less productive farmers up to the levels of the better ones--a classic extension task. In these respects, Africa offers a favorable setting for traditional extension activities.

3) A general problem in African communities has been the poor organization of credit, input supplies, storage, and marketing. Weaknesses of this nature are so widespread that they almost inevitably enter into extension service functions--either directly as a formal responsibility, or indirectly as extra tasks undertaken on the side by the change agent in order to maintain momentum in the official programs.

4) The weakening trend in terms-of-trade for African farmers who want fertilizers, fuel, machinery, and spare parts has made commercialized farming marginal in many remote areas where even a decade ago it seemed attractive. It is extraordinarily difficult to make large-scale mechanized farming pay under African conditions (the exception being a few plantation crops which are grown on large, highly organized estates). In general, we do not encounter marked economies of scale in African farming. Under the prevailing conditions, it is essential that agronomic research programs should be reoriented away from the type of input-intensive, high cost, high volume farming which American experts usually recommend. African farmers need varieties that can be grown with nonchemical fertilizers and pest control.

5) We can also predict that African extension staff will have to work against the grain of current trends: the intensification of high risk plow farming in semi-arid lands, the "backwash" effects of unplanned urbanization in a very poor society, and the continued resistance to higher food prices in the urbanized sector which constitutes each nation's main internal market. The 'vicious cycle' of impoverished, subsistence farming which these conditions reinforce will continue to be the extension worker's greatest single obstacle. There are large zones--not only the huge Sahelian belt, but also the overpopulated highlands of Kenya, Ruanda, and Burundi--where a majority of households live on the precarious edge of total and absolute poverty, where even small adversities can generate major social problems. It will take major, sustained breakthroughs simply to hold rural development at present levels.

6) There are hints here and there of new technologies which might just have the potential to avert the worst effects of present trends. We could explore a switchover to Asian dry area crops (grams, peppers, chick peas, etc.); the jojoba plant might be suitable for combination with livestock production; there are indigenous crops (amaranths, yams, etc.) which have high calorific or nutritional value for a small labor input; new tree crops (Lucinae, etc.) seem promising, and so forth.¹ The major difficulty with all such ideas is the long lead time and large investment required to prove that a promising idea is actually commercially viable. At the moment, neither private industry nor the government research stations have the kind of focussed, large-scale adaptive effort which could translate these nebulous possibilities into practical reality. The truth is that Africa does not yet have a proven technological base which can be relied upon to arrest the present negative trends. Without such a base, African extension services stand little chance of making much difference.

7) Permeating all field activities and all extension agencies is the severity of Africa's administrative malfunctioning. While a few countries have tried to maintain inherited standards of administrative capability--notably Malawi, Botswana, and Kenya--most have been unable to do so. The marked deterioration in service management has particularly adverse effects on agricultural extension, which depends on cooperation from other agencies and puts its staff at remote and inaccessible sites.

¹ Cf. the National Science Academy's Underexploited Tropical Plants; also Leakey & Willis' Food Crops of the Lowland Tropics.

² Wortman & Cummings (1978:186-226) give a chapter on how to organize such "forced-pace campaigns", but their ideas are only feasible once a new technology has gone through its developmental phase.

8) Nonetheless, African states have for the most part opted to give Ministries of Agriculture and allied parastatals the principal responsibility for providing farm-level extension functions. (Here the Francophone states do differ somewhat, having encouraged multinational private agencies like CFDT and SATEC, see Anthony et al. 1979:230-231.) In most of Africa, the words "extension service" have a concrete meaning which has been lost in the developed nations: a large, hierarchical, public sector bureaucracy which tries to station representatives in every rural community. Because immigrants dominated the commercial sector, no consensus is possible about reverting to private-sector alternatives except perhaps in regard to low profile voluntary agencies like OXFAM (which has a particularly good reputation in Africa). Yet the form of organization being maintained at such great public expense is one we can predict will show low effectiveness for performing the functions it has been given.

9) There have been some African success stories, where public sector agencies have accomplished difficult extension tasks. It is noteworthy that most such examples come from the early 1970s, which was the highpoint for African development to date. Three well documented Kenyan examples include the KTDA, which introduced smallholder tea production (a task Asian organizations had failed to accomplish successfully); the Mwea Irrigation Settlement, which got landless Kikuyu to farm irrigated rice under tight supervision; and the National Maize Program, wherein the Ministry of Agriculture working closely with its own research station and private suppliers successfully introduced peasant grown hybrid maize. Examples from other countries could no doubt be cited. Pending field verification--I can vouch for the Kenya examples, which I visited personally--one might look at the Nigerian Tobacco Corporation (Ekpere 1973, Harrison 1969), Ethiopia's CADU Project (Cohen 1975, Nekby 1971), and Sudan's Gezira Scheme (Gaitskell 1959, Barnett 1977). The depressing aspect about the later 1970s and early 1980s has been the retrogression within even these "successes". Somehow the long-run managerial, institutional, and economic factors have been such that they undermined organizations which initially showed high levels of performance. Today, perhaps only the KTDA remains broadly successful.

In sum total, then, Africa presents us with the paradox of farming situations suited to field extension work of the classic kind, but overall trends reducing extension effectiveness and organizational structures that sharply limit the field agent's achievements. We see a clear need for flexible, low level expertise and community assistance---a need that for historic reasons the commercial sector cannot supply. But we also find overstuffed, top-heavy, resource starved bureaucracies without effective technologies to extend and with little beyond staff salaries to work with. To advise how such situations can be improved within present political, fiscal, and agronomic constraints turns out to be an extraordinarily demanding task, one I feel I have not fully discharged in this paper:

The difficulties in agricultural management within LDCs closely parallel those in other technical fields, such as medicine or family planning. Hear, for example, Austin's itemization of the causes of the management problem in family planning programs (1981:357):

First, in developing nations there is a chronic shortage of professionally trained administrators in all fields of activity. Second, family planning programs are usually staffed primarily by doctors, nurses, and social workers--persons who have good technical qualifications but who often lack management skills and experience. Although such a lack may not present a critical barrier to success in the early stages, it almost inevitably becomes a handicap as the program grows and the administrative requirements expand. Third, the rapid and sizable growth characterizing many family planning programs would place severe demands on even experienced administrators, especially given the paucity of resources and often hostile environments... Fourth, program implementation on a national scale often involves a multiplicity of relatively autonomous organizations, the coordination of which further complicates the administrative task.

We have already identified these same four factors as causes of the managerial problem in agriculture, so it would seem we are dealing with a functional syndrome more related to the context of development than its specific content. If so, there is a prospect that causal explanations derived from agricultural sector performance may have wider applicability to other aspects of national development in the poorer LDCs.

II. EXTENSION AND TECHNOLOGY TRANSFER

1. Extension or Technology Transfer?

For our purposes in this paper, agricultural extension is defined to mean the linking of farmers to producer assistance which meets farm and rural needs. It is often a 'top-down' function, wherein public sector agencies at national, provincial, and then district levels seek to extend their influence to rural communities and ultimately to individual farmers. However, it can also be a 'bottom-up' activity, when farmers individually or in groups seek out types of assistance they need. The core idea is the linkage aspect: that by organized action farmers are brought into contact with kinds of assistance --information, services, diagnostic advice, new skills--which farmers individually would not otherwise enjoy.

By conceptualizing extension as a linking activity we are able to encompass several rival views concerning what the proper role of an "extension agent" should be. In the literature, one finds seven overlapping definitions of the extension function. These include:

- 1) Extension as a conveyor system for technical information.
- 2) Extension as the organized diffusion of innovations.
- 3) Extension as giving farmers new skills (adult education/training).
- 4) Extension as supplying services (seed certification, market information, artificial insemination, etc.) needed by the farm community.
- 5) Extension as identifying and resolving rural problems (the so-called "vacume" or "catalyst" model).
- 6) Extension as the organization of farmers to do things jointly which they cannot achieve individually (the "group action" model).
- 7) Extension as putting farmers in touch with types of specialized expertise which they require, such as soils' testing or disease diagnosis (the "linking function" model).

In summary form, we see that extension is variously thought of as being mainly information delivery, training, service supply, or farmer organization.

A broad definition is essential to avoid the sterile argumentation which one often finds in discussions of what ought to be done in extension work. It should be obvious that farmers, and farming communities, differ greatly in the specific kinds of assistance they require--both at one point in time, in terms of their farming systems and various personal situations, and over time as the farming system becomes commercialized and the level of aggregate demand rises. For example, ranchers will need farm services --

disease diagnosis, pest control, forage planning, and feed availability--which are quite different from those required by the smallholder or the irrigation farmer. Where farmers are illiterate, poor, and scattered, extension must focus on training and the diffusion of innovations. In other places, there will be community-level problems (unreliable water supplies, disease outbreaks) necessitating group mobilization. And in all of these instances, the nature of assistance needed will change as the volume of production increases and farmers become more skilled. Under high volume, commercialized farming many producer services which in a subsistence farming setting must be publically supported can be offered instead by private firms. Thus there is no single "best" or "correct" extension role: farming systems are highly dynamic, and as they change so too does the kinds of assistance they need.

We can, however, identify certain common components which enter into making agricultural extension an organized activity. First, there is the farming system being served. This may be homogenous or heterogeneous, mono-crop or multi-crop, subsistence-oriented or commercially-oriented, large-scale or small-scale, mechanized or non-mechanized. All of these distinctions have definite implications concerning what kinds of assistance farmers need, so much so that many agronomy texts simply classify the whole system by reference to its dominant crops. Second, there is the degree of client organization among the farmers being served. Here enter the rural sociologists' variables: types of family system, land tenancy, formal groups like co-operatives, social networks, and community leadership. Third, we often have a resident change agent--somebody who bears specific responsibility at the local level to see that needed assistance is actually offered. Change agents may be salaried or non-salaried, part-time or full-time, farmer chosen or nominated, public sector or private, permanent or temporary, from the area or strangers. Fourth, we can look at extension tasks, the actual assistance being offered: information, technology, training, advice, service, mobilization, etc. Fifth, there often will be supra-farm agencies which provide this assistance to the change agent: what can be termed the extension organization or alternatively the service delivery system. These may be public or private, subsidized or cost-recovering, multi-functional vs. single purpose, centralized vs. dispersed. Sixth, the more complex kinds of assistance require inputs from various other agencies and linked

production services: what I will term the inter-organizational matrix. In tropical agriculture, because of the diversity of crops and environments and because of the changing mix of farm activities over the cropping cycle, the inter-organizational matrix tends to be quite complex. Its reliability and efficiency may become as important for extension success as any of the other components in the process. The seventh ingredient is comprised of community-level infrastructure and characteristics: aggregate cash flow, available commercial services, transport, and a whole range of subsidiary considerations which are taken for granted in US farming. Eighth and last, we may also have access to technological innovations as the focus of extension effort.

This simplified model suggests several preliminary observations: 1) The productivity of extension work depends in large part on the behavior of the total system rather than on the output of a single component. 2) Where so much variation exists within sub-components, we can expect to encounter rather diverse organizational solutions within the service delivery component. 3) The process of economic development fundamentally affects several components, and so strongly influences system design. 4) Some components represent large investments of a relatively permanent nature. 5) Once national systems for agricultural extension are in place, LDC policy-makers will be reluctant to consider switching to entirely different types of system.

We should recognize that while technology transfer may be the major focus in some extension programs, there are other contexts where it may have only a minor role. Examples of common extension activities where the technology transfer aspect is not prominent would be: provision of market information, various planning functions, organization of input distribution and crop storage, diagnosis of on-farm problems, getting farmers to cooperate in joint activities (like digging irrigation furrows), or taking group action to resolve community problems. Feedback from the farm-level is another vital extension role which does not fit neatly into the "transfer of technology" conceptualization.

An emphasis on technology transfer as the principal function of agricultural extension makes sense at the middle stages of rural development, after infrastructure exists and there are institutions in place to generate and to support the technologies being extended. That this is so can be seen from our own economic history in the USA, where although the reaper was in-

vented in the early 1830s it did not become popular until the 1850s when farm sizes were larger and harvest labor was becoming scarce (Paul David's arguments cited in Rosenberg 1982:22). In US farming, output per worker more than tripled between 1840 and 1911; of this, 60% can be attributed to mechanization, with two innovations alone--the reaper and thresher--accounting for 70% of the total gains from mechanization. The spread of mechanization in England after 1850 was, by way of contrast, slow. England's farmers worked small fields on hilly land, often split by numerous hedges, irrigation furrows, and other obstacles, and their activities were constrained by complicated legal and institutional arrangements (Rosenberg 1982:23). We can see immediately why "extension work" in England has tended to emphasize farm planning and carefully adjusted crop advice, whereas in the US we think of it as being primarily comprised of technology transfers.

Our model can also explain why American advisors so persistently misjudge extension needs and capabilities in LDC contexts. Americans see extension as being primarily an educative function. This definition reflects several emergent features within US agriculture: 1) Historically, the "moving frontier" made it unnecessary to accommodate to resource constraints in the initial stages of US development. 2) By the early 20th century, US farmers had benefitted from new technologies and needed little further convincing that technological change could be profitable. 3) In the central heartland by the time farm sizes began to increase dramatically, industrialization could absorb the population outflow. 4) Farmers considered themselves the social equals of their advisors and trainers, and were in a position to exert upwards pressure upon the businesses and colleges serving them. 5) The large increases in productivity made it feasible to commercialize many producer services (seed distribution, etc.) at an early stage. 6) Producer services have generally been efficient and accessible. 7) Farmers and their suppliers have enjoyed the benefits from rapidly evolving technologies, which in turn were supported by publically funded research. 8) Farmers have often received transport, water, and energy at subsidized rates, augmented in recent decades by subsidized credit, price supports, and tax-write offs. 9) The land being cultivated was some of the richest farmland on earth, growing well established cereal crops which proved to have a large potential for yield increases.

This description does not apply to all American farming, obviously, but it does fit the general trend evidenced in the mid-western heartland, where the great land grant colleges were located and US extension work took organized form.

These are, then, very special advantages. Where in developing nations similar features were encountered--e.g. among North Mexico's Sonoran wheat farmers or in North India's rich Punjab plain--the US "extension" approach based on direct contact between idealistic agronomists and enthusiastic local farmers has been wondrously effective. But elsewhere the US model has not transferred easily. It seems that the basic sameness of agricultural field tasks the world over--seed selection, ploughing, irrigation techniques--has blinded experts to less visible differences in the total system. Most US extension training emphasizes proximate decision-making at the farm and community levels, e.g. "extension methods" and "program organization." This concentration on farm-level issues makes sense when farmers have access to capital, when the overall farm services are efficient, where there is available technology to extend, and where farmers are a relatively homogeneous and non-exploited group. Outside of this kind of setting, the US trained extension specialists find their approach offers little analytic guidance.

Let me stress, therefore, that contexts matter a great deal when we are diagnosing extension needs, designing field programs, or offering farm level advice. Throughout this paper I specifically address typical African extension situations, the ones I know best from nearly 20 years of direct personal involvement in East Africa. I do know the literature well enough to state unequivocally that a different paper would be needed to address either Latin American or Asian needs. On those two continents the higher quality of producer services and the better organization of international as well as in-country agricultural research makes a technology transfer approach far more attractive. It may disappoint users of this document to be told that in Africa, to the contrary, we do not yet have effective technology generation and support institutions except in a few, favored areas like central Kenya. Thus the focus of this paper is necessarily upon how donors might go about the difficult task of creating such capabilities within Africa's existing institutional networks.

2. Why Take Extension Seriously?

The case for giving serious attention to the problem of LDC extension effectiveness rests upon the following arguments:

1) Contrary to statements by theoreticians, in actual fact agricultural extension has sometimes been a key ingredient in stimulating the transfer of technology. The "success" stories include a few large-scale programs like Kenya's hybrid maize or the Philippine's Masagana 99, and many smaller examples. These are sufficiently well documented to show that when the technology works and activities are carefully organized, extension can be effective.

2) With a few exceptions, LDCs have comparatively large Ministries of Agriculture. Usually these ministries bear the primary responsibility within their countries for monitoring and assisting agricultural development. The crops being grown are often of critical importance, since they may be the principal foreign exchange earners upon which many other initiatives depend. The existing institutional commitment is large: in India, for example, we are told that by 1968 there were over 6,000 agricultural extension officers with another 18,000 in related fields (such as livestock husbandry, irrigation, and cooperatives), all giving orders to some 58,000 village level workers (Shenoi 1975:87). To produce this army of salaried advisors, India at that time operated 120 training centers for village-level workers, 3 extension training institutes, 45 extension wings at agricultural colleges, and 15 graduate departments of extension (Axinn & Thorat 1972:28). These days even a poor country like Tanzania will have approximately 10,000 salaried ministry and extension workers and will operate 13 agricultural institutes, 5 natural resource institutes, 10 crop parastatals, 8 livestock parastatals, 4 agricultural implement parastatals, and several clusters of agricultural research institutes (Moris 1982). Similar figures could be obtained from many other countries: Nigeria, Kenya, Zaire, Ghana, etc. The point is simply that in aggregate within any single country one usually finds a large investment in agricultural extension and training institutions. Furthermore, over the short run this remains a relatively permanent commitment not subject to radical alteration. The choice facing donors is not whether any particular country needs public sector extension services, but rather how, given existing investments, existing institutions can be made more effective.¹

¹A further incentive for donors to look at the productivity of these institutions is the research finding that in at least the internal operations of such organizations, many "western" managerial findings do apply (Leonard 1977, Kiggundu, Jorgensen & Hafsi 1983).

3) A root problem is that in the early stages of agricultural development commercial services offered to farmers are often not a paying proposition. There are several reasons why this should be so. Farm sizes in Africa and Asia are often small—miniscule by US standards. Where farmers are producing largely for subsistence, the cash flow within the community will be too small to support secondary farm services (no matter how vital these might be to producers). The demand for services will be concentrated in small pockets, and will vary seasonally... For a whole cluster of reasons, then, the private sector simply does not step in to perform the role it may later take on once demand is monetized and the volume of trade is large.

Writers often do not recognize that agricultural extension is a phase governed function. Unlike most other components in the development process--varietal research, professional training, credit, irrigation, etc.--extension becomes more and more marginal once commercialized farming takes root and a complex of private agricultural support services have come into full operation. (This is, in fact, why most US "extension" programs have long since re-defined their own functions to emphasize off-campus academic instruction or social events like Chamber of Commerce dinners.) In Germany, for example, there is nothing equivalent to formal extension work as we used to know it in the USA; the commercial suppliers do it all. Even in the USA, it is mostly the older generation of professionals, perhaps recalling their own farm boyhoods, who still understand why an "extension service" is initially an essential part of the development process.

Yet for those who care to look, the record of activities in the USA shortly after the turn of the century bears more resemblance to the situations in LDCs than it does to our own, highly mechanized agribusinesses of today. We have long since forgotten that the threat which brought Seaman A. Knapp and other pioneer county agents to the fore was the boll weevil in the US South--a threat which only determined public action in sponsoring a package of improved husbandry innovations was able to counter. Or that on Knapp's famous initial "farm demonstration" at Terrell, Texas, a key ingredient was his negotiation with local bankers of a guaranteed support payment so that participating farmers were, in effect, making a riskless choice--a lesson which even large development programs have had to re-learn in the 1970s, e.g. the Cacqueza Project (Scott 1970:209-15). It is with good reason, then, that Scott titles his history of the origins of US

extension work The Reluctant Farmer. The main issues of the time revolved around matters like the amount of territory one agent could cover, how to coordinate the efforts of multiple agencies, how to organize, support, and supply the farmers' institutes which were springing up around the country, who should teach in the farmers' institutes, and how all of this activity should intermesh with the parallel establishment of experiment stations and the land-grant colleges (Scott 1970:106-110, 138 ff, 227-229). It is precisely such matters which engross the staff of Ministries of Agriculture within most LDCs today; the fact that for us in America these are dead issues in no way proves that the same situation obtains in developing nations.

We must also recognize the equity argument. There are now sufficient field studies of the transition from subsistence to commercial farming to show that minor differences in how the process occurs can have a tremendous and lasting effect on peasants' welfare (Eder 1982, Critchfield 1981, Wolf 1969). The HYV programs in India and Mexico ignored this aspect, and as a consequence existing rural elites captured many of the initial benefits (Griffin 1974, Pearse 1980). In the longer run, it has been those countries like Japan and Taiwan where access was most evenly spread which have generated the largest continuing gains in agricultural productivity. Thus organized extension work at the initial stage of transition into commercial farming should be used as a policy instrument to widen participation and thereby offset trends which would otherwise yield a dispossessed class of agricultural workers before the national economy can absorb them into alternative occupations.

4) In regard to technology transfer, it does also seem that research institutions cannot do the whole task alone--excepting perhaps those few "miracle" innovations whose benefits are so great they will spread themselves. More commonly, yield improvements in the range of, say, 10-40%, require careful field testing under many environments. Typically, a research institute has neither field staff spread throughout the country nor adequate understanding of localized constraints. There is also the need to report disease outbreaks and to coordinate the supply of inputs. The reason these are classically extension rather than research functions is that they require resident field staff dispersed over a wide areas. The current tendency to fund new research institutions without insisting upon close linkage to allied extension services is, in my view, foredoomed to failure.

5) Organized extension outreach continues to be a significant component in many technical assistance projects. Admittedly, there is danger this function will get sacrificed to other expediencies once projects are on the ground--but that is all the more reason to maintain systematic monitoring of extension effectiveness. The central place of presumed extension impact within a project's 'log-frame' ought to dictate that the maximum organizational pressure will occur in the final third of a project's life, when all components are in place and projected outputs begin to materialize. In point of fact, because projects are often late in getting established, at just the time when genuine extension work begins to occur many projects lose donor support. The benefits remain paper targets, never physically enjoyed by the projected beneficiaries. It is not, therefore, a question whether or not to have organized extension outreach--the issue is instead whether the many present investments which are predicated upon effective extension outreach actually do pay-off. It is my observation of both USAID and World Bank African projects that the softness of project planning and implementation in the extension sphere is a critical weakness contributing to the inability of most externally assisted programs to sustain their projected benefit streams.

6) Agricultural extension has the potential to become a professional 'home' for specialists in agricultural management. At present, those interested in agricultural sector management have no real base within the US academic and professional system. At conferences on this topic I meet people who otherwise are never in contact. Some identify as development administration specialists, others as economists, others as agricultural economists, and a few as applied anthropologists. It is indicative that US agronomists and "extension educators" show almost no interest in LDC agricultural management; neither do US rural sociologists. Koppel and Beal found in a recent survey of 26 US graduate rural sociology programs, only a handful still maintain international interest (1982). As they subsequently noted, "one implication is that there are virtually no openings for new faculty whose prime interests are international" (1983:2). When donors need expertise on this topic, the people available are often only partly prepared or else must be disengaged from other professional interests which carry greater immediate career prospects. And yet the field problems are complex, requiring a high level of skill and sustained attention.

7) Another major reason for strengthening extension capabilities is the vastly increased potential offered by new communication and data processing technologies: instant photography, the cassette recorder, the video-recorder, TV transmission, and microcomputers. In today's world, even Peruvian peasants own television sets; while among Yemenites TV sets may outnumber radios! Looking ahead one can foresee that during the 1980s: i) rural residents around the world will leapfrog formalized instruction to become a growing TV audience; ii) nations will broadcast whatever materials they have readily at hand; and, iii) young professionals will return home the proud possessors of microcomputers whose vast data analyzing capacities will probably remain largely underutilized. Thus we do not need to do anything to create the potential: it has already arrived. The question is, instead, whether we wish to tap this potential to accelerate technological learning. If the answer is "yes," we come back inevitably to a need for a more effectively organized extension input.

8) The final reason for giving extension greater prominence may be the most important. We have argued that "hard" technologies often do not readily transfer in the African setting. The implication is, therefore, that local decision-makers will have to play a more active role in selecting, modifying, testing, and supporting technological innovations. Such procedures are themselves a form of technology, but "software" rather than "hardware". As Mexico's Puebla Project indicates, the initial development of effective organizational innovations is very demanding of expert time, and hence expensive. Once perfected, however, such routines usually can be transferred quite widely within a regional grouping of states which share similar administrative traditions, e.g. the Francophone African nations. Thus while specific items of technology such as a given plant variety may not have wide currency from country to country, the procedure for testing and adapting genetic materials does. If we think of extension administration as largely consisting of "software" for the handling of basically similar tasks, there is every reason to look over the fence to see how other nations have solved a particular problem. The material support required by, say, radio listening groups learning maize production in Zambia is very similar to what Malawi, Tanzania, Kenya, and Botswana might require. The varieties, then, will differ more than the organizational contexts. I stress this point because the various African countries have been reluctant to undertake such sharing between themselves; donors are in a far better position to encourage rapid circulation of pilot materials and ideas about extension methodology.

3. Agency Performance at Present

Extension functions can be offered by a variety of organizations and agencies. Rather than arguing what is or is not "extension", let us simply agree that any service delivery system aimed at promoting agricultural development can qualify. Under this broad definition, one finds typically a Ministry of Agriculture with its many officials and field agents which in African countries is usually assigned the primary responsibility for agricultural extension. But there are these days many alternative institutions which also qualify: co-operatives, community development, livestock and veterinary services, water development, input corporations, agricultural research institutes, and so forth. From an organizational standpoint, the diversity of functional labels is misleading. Basically, most LDC extension systems are either branches of some government department or ministry, or else they are parastatal agencies. The two are not identical, but from the standpoint of technology transfer they tend to have similar structures and common weaknesses. We shall use the terms "agency" (for parastatal) and "ministry" interchangeably, while recognizing that in any given country there may be significant performance differences between the two.

While the roots of these organizations often go back into the colonial period in Africa and Asia (extension as a concept is a recent introduction in much of Latin America), it is nonetheless true that the emphasis upon agricultural extension as such came generally with the first generation of institution building projects (1955-65). Newly independent countries were eager to add to the limited range of service institutions they had inherited. With or without donor assistance they build agricultural colleges, added research institutes, created ministries of planning, set up irrigation authorities and in general filled in the major gaps. There are only a few of the very poorest countries of Africa or Asia--Somalia, perhaps, or Nepal--which do not have these days something between 30-100 various rural development agencies. Most have a large public sector commitment to controlling, managing, and stimulating agricultural development.

It goes almost without saying that the many UNDP and USAID advisors who planned these agencies expected them to perform in the stipulated ways. Nobody foresaw that over time, as the total agency complex expanded into a large network of semi-autonomous institutions, these would acquire administrative characteristics which make them part of the problem rather than an answer to farmers' service delivery needs.

The typical LDC extension service differs in many ways from the type of extension organization US trainers are familiar with from the American context. The main differences are:

- LDC extension services tend to be strongly hierarchical, "deep" rather than "broad" in terms of institutional structure.
- LDC extension services look upwards for directives rather than downwards for approval. Staff think of themselves as civil servants or, at best, as ministry representatives.
- There are few effective means for disciplining middle and upper level staff, with the consequence that transfers of staff tend to become a general solution for all types of problems and the rate of rotation between assignments remains high.
- Similarly, for bottom-level staff civil service regulations often provide a cushion against lay-offs and make it difficult to exert effective discipline for any but the most flagrant offences.
- The bottom-level, contact cadre equivalent to the US county agents have weak training, poor motivation, and hardly any discretionary resources. In particular, they depend on higher levels for access to transport.
- This situation results in part because virtually all ministry resources go into staff salaries, leaving very little on the margin for vehicles, travel, and equipment.
- Extension agencies are assigned to fairly specific sub-sector functions which cross-cut the necessary sequence of crop related support activities, e.g. irrigation, fertilizer supply, credit, research, land reform, crop husbandry, animal husbandry, etc.
- These bureaucratic boundaries affect two dimensions of technology transfer: 1) internal and inter-organizational communication, and, 2) the acceptance of joint responsibility. Both are problematic.
- Members of the extension service generally do not find that effective field service yields recognition and career advancement; to the contrary, many assignments of vital importance for development nevertheless impede the likelihood of the individual's advancement.
- Finally, the general circulation of technical information--new products, disease outbreaks, husbandry innovations, breed performance, etc.--does not occur.

These structural attributes have a large influence upon how LDC extension agencies perform. There are, of course, internal differences from country to country (see Table 2). In broad brush outline, however, the ex-British and ex-French African countries have similar ministry structures which evidence the same weaknesses when given the responsibility for promoting technology transfer. To understand these weaknesses, let us examine how the research-ministry-extension linkage actually operates at each level.

I. Contextual Variables

II. Organizational Variables

III. Task Variables

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|--|---|---|
| <ol style="list-style-type: none"> 1. Degree of ethnicity 2. Urbanization "backwash" on far ers' attitudes 3. Resource availability (land, water, crop) 4. Degree of dualism in economic system 5. General reliability of inter-organizational matrix 6. Availability of inputs 7. Degree of scheduling uncertainties 8. Village-level cash flow 9. Attractiveness of the alternatives 10. Manpower constraints by level and type 11. Occupational prestige ranking 12. Degree of personal security 13. Availability of financial services 14. Degree of financial thinness & dependence on donors 15. Degree of decentralization 16. Degree political interference 17. Degree commitments seen as "flexible" 18. Prevalence of "personalismo" | <ol style="list-style-type: none"> 1. Steep vs. broad hierarchy 2. Rates of staff movement & turnover by level 3. Site concentrated vs. dispersed 4. Degree of internal staff polarization 5. Abundance of organizational resources, by level 6. Degree of commitment by top leadership 7. Political salience of the organization, power 8. Age & skill composition of labor force 9. Rigidity & nature of in-house decision rules 10. Annual reporting, work, budgetary cycles 11. Objectives: single vs. multiple, clear vs. vague, realistic vs. unrealistic 12. Size of middle management vs. top & bottom cadres 13. Internal staff perceptions: career advancement, workload, fairness, relative prospects 14. Authoritarian vs. participatory management & supervision 15. Client loads per contact staff 16. Client contact procedures 17. Staff/client polarization | <ol style="list-style-type: none"> 1. Routine vs. discretionary 2. Technology intensive vs. resource intensive 3. High technology vs. low technology 4. Governed by seasonality? 5. Task quality tolerance margins 6. Require transport? 7. Require 2-way communication? 8. Skill level required 9. Require cash inputs by farmers? If so, when? 10. Does output have high payoff? 11. Is effective performance visible? 12. Are constraints known and visible? 13. What level riskiness? 14. How subject to organizational risk? 15. What inputs required? 16. Single vs. multiple function? |
|--|---|---|

1) How the Research-Extension Linkage Operates

How well does the kind of structure we have outlined perform when involved in technology transfer? It seems fairly clear from the record that the typical mainline ministry in Africa functions poorly in regard to:

- Sharing responsibility for key tasks among several agencies.
- Receiving upward feedback from farmers about their needs and problems.
- Giving sustained support to new programs at the local level.
- Maintaining an institutional memory about previous experience.
- Developing decision rules to suit new tasks as they arise.
- Adapting organizational packages to suit local needs.
- Exploiting new opportunities on the farmers' behalf.

Yet, paradoxically, it is these very functions which greatly affect the success of agricultural development projects.

Given such disabilities, might not a HYV program spread itself without public agency involvement? One's answer to this proposal must be mixed: "Yes," for those rare instances when the innovation has a high payoff, but "no" for most of the technologies presently available. We have already argued that where the target farmers live in different ecological zones (as they do in many African districts) the technology must be thoroughly field tested. Running such trials is an expensive and exacting activity. Either the research institution must build up its own army of field assistants scattered over the countryside, or it must bring in the formal extension service to help organize, supervise, and evaluate field trials. And so it goes in regard to each of the support functions the HYV approach requires: water management, fertilizer availability, herbicides, credit, seed bulking, and storage. Despite its weaknesses, the Ministry of Agriculture does at least have field agents already resident in most communities; retooling such staff to do a better job of technology support is bound to be a lower cost solution than having each specialized function establish its own field network.

If so, we must take a closer look at the particular weaknesses which cause low extension productivity at present. What we have described above is a situation wherein top managers do not trust or encourage their middle-rung staff; where rapid and open circulation of information is discouraged;

where research staff may be isolated from recognition and hence promotions; where the recurrent budget so vital to field experiments is frequently cut at short notice; where there is rapid turnover in professional staff; where spare parts and supplies are often not available; where key specialized positions may be left unfilled; where bottom level staff are slovenly and unreliable in the performance of their duties; and where for all these reasons projects are rarely carried through to planned completion. These traits have a devastating impact upon adaptive agricultural research. It does seem that the most critical support requirements needed by researchers are the very capabilities least adequately supplied by the standard civil service structure.

Perhaps this explains why the output from most African research stations is their annual reports. As likely as not (judging from those I have read in Kenya, Tanzania, and Uganda) these present raw experimental results in uninterpreted statistical form. They will be written in stilted scientific jargon, intelligible only to the writers. The mainline ministry will have little capacity to interpret, package, and translate such information. Perhaps this is just as well. African research stations until recently did not record labor inputs, assumed (as we keep re-emphasizing) access to inputs, and ignored risks. Rarely were results adjusted to account for farmers' varying managerial skills and resource availabilities. Such "recommendations" arrive eventually at the district office, where some hapless recent graduate struggles to translate them into the simplified vernacular required by the field agents. The contact staff then in turn read out these instructions--which from previous experience they do not trust--in public meetings that are attended mainly by the oldest, semi-retired farmers. In such meetings (which are a heritage left by the colonial period across Africa) decorum inhibits farmers from voicing their frank disagreement with many of the technical recommendations. And, finally, when they get home they may choose to tell their wives what was said; but often they do not.

It would be pointless to go on heaping detail upon detail to complete the grim picture. The facts of the matter are that with a few exceptions the average Ministry of Agriculture is not an effective or reliable channel for introducing anything but the very simplest innovations. Transfers of technology do occur, but not these days through the formal institutions which, ironically, derive their main justification from this task!

2) Deteriorating Research Institutions

How did these same ministries support more effective agricultural research during the "first generation" campaigns of the 1960s? Here I can only speak for East Africa, where the situation is as follows. Ukiriguru in Tanzania did develop high yielding varieties of cotton; the Kitale hybrid maize was introduced throughout western Kenya by the extension services; and the KTDA was able to teach smallholders how to carry out vegetative reproduction of tea plants. If then, why not now?

First, we should note that the expatriate staff who manned these stations in the 1960s were highly motivated and experienced despite their comparatively young age. They were already publishing their results for an international audience, in journals where good work was quickly noticed. The senior staff from these stations went on to promising international careers: Collinson from Ukiriguru into farming systems research (as did Farman from Nigeria); Anthony from the Overseas Cotton Development Corporation in the Sudan to head up ODA's agricultural research in London; Van Rensburg from pasture research at Kongwa into FAO; Walker from Tanzanian livestock research into the Australian system; Huxley from coffee research at Thika in Kenya into FAO; and so forth. It seems, then, that staff leadership was of reasonably good quality.

Second, during the 1960s the research stations were few in number and deeply staffed, rather than as at present being numerous and thinly staffed. Most had a mono-crop orientation, giving the research programs clearer focus. Imports were not restricted and spare parts were available. Researchers had a clear concept of the problems requiring solution. They had the authority and respect which stimulated reasonably careful work by the field assistants. Errant field staff were in those days subject to dismissal on the spot. Thus while the total resources being devoted to agricultural research were probably less then than now, they were more effectively used.

I suggest that the changes which have occurred since then do not consist of obvious features which are easily documented. Superficially, Africa's research stations look much as they always did: small bureaucratic units run by specialists who hold their appointments in a parent technical ministry. What has changed is their mode of operations, which now incorporate elements

of the larger bureaucratic culture which transcend the individual research director's control. Officials who should be interacting now fail to do so because they feel constrained to operate through "official channels". Actions which are urgently needed do not get taken, because individuals feel they lack authority. People do not publish research results, because either they do not have the statistical skills to interpret them, or else they are transferred before the experiments are completed. Researchers feel neglected by their parent ministry, and complain about equipment which cannot be fixed and transport which does not run. Researchers do not control their own budgets, and feel alienated when funds are cut off without warning. Staff being assigned to the research institutes often have no particular aptitude for this type of work... It is in regard to these vital but invisible aspects of organizational culture where the main deterioration in research station productivity is occurring.

There are still undoubtedly some exceptions, instances where highly motivated professional staff are producing exemplary results. On field visits, one does now and then encounter the isolated bush station where experiments continue under far more difficult working conditions than we faced in the 1960s. Nevertheless, I suggest the trends point in a negative direction only partly masked by occasional infusions of FAO experts to shore up what are generally stagnant research institutions.

In such situations, donors have begun to query whether ministry-linked research stations should even be the main site for technology adaptation. After all, in India during the 1960s US assistance was directed instead at creating agricultural universities to serve as the apex of what was then a weak and ineffective (albeit overstaffed) extension service. A combined research-and-training institution does appear to have advantages over the isolated research station. It can afford a larger pool of specialized staff, better laboratories kept in constant use, better access to information resources, more direct contact with international agencies, higher caliber service staff, more attractive career prospects, and a larger network for publication and peer recognition. These are potent factors to weigh in the balance if the general trends are negative. A land-grant style institution has its own problems, of course, but these are not nearly as severe as those of the isolated, ministry-run research station.

3) Missing Middle Management

As long as the visitor stays in the Ministry's headquarters' offices, airconditioned and tidy, or accompanies provincial staff on the usual one-day "field" tour, the LDC managerial context will seem relatively familiar. It is not until one reaches the district level, out in remote areas perhaps a hundred miles from the provincial headquarters, where the true difficulties of public sector agricultural management become visible.

Let us for the moment visualize the situation commonly faced by the agriculturalists who have been put in charge of a district's "extension services" (or DAO, as we will term this position for purposes of discussion). The DAO will have at best only modest physical facilities, perhaps 3- rooms strung lengthwise along an external corridor. After the DAO's own office, there may be another room holding 2-3 "diplomates" who have been assigned special duties such as running veterinary services, conducting the national agricultural census, or administering an IDA maize credit program. Between the two will be found a "general office" presided over by a clerk and containing 2-3 "typists" and maybe a "files clerk" in charge of the "registry". (The "typist" designation is literally correct; these individuals have no power to commit the DAO's schedule and perform no secretarial services beyond the physical typing of documents and letters.) Letters arriving are typically dealt with by the "files clerk" who assigns them to a file by their reference number. Sometimes they are seen by the DAO, sometimes not. An unnumbered letter stays in limbo, floating from table to table or perhaps inserted into a bulging "miscellaneous" file. To the side may be a small room for the mimeograph machine and perhaps another containing "closed" files and some insect infested certified seed left over from last season's campaign.

Outside on the cement walkway will be the messenger and his bicycle, the "tea lady" with her charcoal burner or primus, and an official driver or two. Several junior extension agents will have clustered by the door in hope of trapping the DAO into hearing their particular personal problems. The yard may be half filled with derelict machinery and vehicles, several on blocks. The DAO is lucky if two are operational, maybe only one--the UNICEF supplied "cinema van" originally provided for the District's family planning program--is running at the moment.

The theoretical urgency of performing field tasks on time contrasts strangely with the lassitude which pervades the typical African field office. By ten in the morning the temperature is already uncomfortably hot. All windows are open and fans whirring. Of the ten or so people physically present, seven are "junior staff" and half of these waiting for the occasional assignment which requires their particular duty. The station's senior driver has taken the one available vehicle off to town in search of fuel, and is now a hour late in returning. Tea will be served in half an hour. The scheduled visit by FAO experts has not even commenced because they are waiting at the hotel for their transport... And so the day goes: one small event after another, meetings constantly interrupted as messengers bring in checks for the DAO to sign or the office empties because there is a rumour that sugar has come to the shops in town. To mobilize focussed, timely, and cumulative action in such settings requires an extraordinary effort on the DAO's part.

The US efficiency expert would tackle this situation by making immediate changes in the physical environment: ordering air conditioners, a Xerox machine, calling the public works department to remove the wrecked vehicles scattered about under the trees. Just try! Air conditioners must be ordered from abroad--requiring from the district level a three-stage approval to the central bank for access to foreign exchange, and this year's quota was already allocated to last year's unmet needs. The nearest Xerox agent is in Nairobi, a thousand miles and two national borders away. Moving the vehicles requires a crane--which the town does not have--and would sacrifice their value as a cheap store of accessible spare parts. (Of course, because spare parts are unobtainable everything that can be unbolted has been.) The Ministry, recognizing the high value of even wrecked vehicles, has imposed elaborate procedures that must be followed to "write off" any equipment from the official registry. In Tanzania, for example, a student of mine documented it took 358 and 592 days involving 36 and 56 separate administrative actions to "board" two unserviceable Landrovers. (By his analysis the task could have been reduced to only 24 steps requiring 4 months, a major improvement he reckoned.)

And how has the DAO been prepared for the strategic role of mobilizing action and allocating scarce resources between the 20-40 communities that await extension assistance? By from two to four years of technical instruction in chemistry, agronomy, forage species, entomology, animal production,

price theory, history of the US cooperative extension service (if trained abroad), perhaps even tropical fisheries or beekeeping. We have here the exact analogue to the situation described by Young et al. for the Uganda Co-operative Department: a cadre of bright, well trained young officials assigned to supervise field activities but prepared in a body of theory which emphasizes the substance of technical decisions and not the process for carrying them out.¹

There are a few staff with long experience in the district, but generally only among the junior ranks because of the Africa-wide custom that national elite must be posted outside their home areas to avoid "tribalism".² Or sometimes a senior person who is an embarrassment at higher levels is left in remote districts for long periods as a punishment. Neither group will be sought out by the DAO for guidance. The programs to be implemented will either express current national campaigns (T & V system, cash crop targets, IDA financed loan recovery, etc.) not of particular relevance to local farmers' needs, or they will reflect the DAO's own background and personal predilections. What one does not get out of such systems are strategically designed programs matched to the needs of actual communities and built upon foundations laid at earlier phases. When the DAO leaves in six months' time to undertake "counter-part" training in an FAO fisheries' officers course--this assumes the DAO has retained connections in the headquarters' personnel section--the next DAO will likely as not start over, emphasizing perhaps the same Ministry programs but placing them in different locations. At the local level, this will not cause the upset we might suppose, because village leaders have long since learned senior staff rarely stay for long and so their promises are statements of transient intent but not lasting commitment.

Another serious problem the DAO must resolve is how to influence the inter-organizational matrix of field agencies upon whose services the district's agricultural output depends. In some countries, such services have been put under a supervisory committee chaired by the DAC--if so, the DAO is unusually fortunate. More commonly, each agency guards its own line

¹A similar "no-win" structural situation can be seen in many parastata production agencies, such as state-operated livestock ranches. See my description elsewhere (1981:56-57), where I argue it is a mistake to view the resulting high costs as having been caused by "poor management".

²For a useful depiction of this phenomenon in Uganda, see Jacobson (1973).

of control penetrating upwards to the national level. A few large agencies can afford to duplicate the Ministry of Agriculture's territorial hierarchy, but many cannot and so may be absent at the district level. If we aim for horizontal integration of functions by territorial units, probably the only level at which this is operationally feasible is the provincial level, where usually most major agencies have representatives.

A third weakness is the lack of agreed procedures for spatial planning and for deciding where field activities should best be located. In many LDCs, locational decisions are perceived as being essentially political in nature, since they do strongly influence where benefits will be received. But politicians have often proved themselves poor judges of technical potential, giving disproportionate assistance to a few "pet" areas while neglecting others entirely.

A fourth weakness of the system as presently constituted is its internal 'top-down' administrative rationale, which puts all the responsibility upon the person at the apex of each administrative unit. To meet these expectations, the person responsible will tend to fall back upon a characteristic mode of "hub-and-wheel" task integration (Moris 1972:128-29):

Told to organize complex activities from scratch without supporting professional staff, the centre-post man sets up a circle of subordinate workers each capable of doing one limited aspect of the total operation. Thereafter, it is always quicker for the centre-post man to perform the difficult tasks himself than it is to train someone else each time a special skill is required. The subordinates soon become accustomed to relying on the centre-post man for all inputs of a supervisory, planning, co-ordinating, or decision-making nature.

Several consequences follow in regard to the organization's productivity:

- i) despite the small numbers of staff at any one field location, they will remain strongly polarized between "managers" and "workers";
- ii) the crucial diagnostic, planning, and integrative skills are only possessed by the manager, and often are not even formalized as a part of organizational routine;
- iii) managers think of themselves as very hardworking (which they are) and derive considerable satisfaction from the power they wield;
- iv) workers get little satisfaction and work reliably only when personally obligated to the manager; and,
- v) there is nobody who can replace the manager from within the group, even though the manager feels overworked.

In short, these are the causal mechanisms which help generate "personalismo" as a style of management (found almost everywhere in LDCs). Task oriented teamwork and participative management stand no chance of adoption in such a system.

Our fifth and last area of middle-management difficulty arises out of the tight constraints which limit what the DAO can do. Either the resources at the DAO's disposal are woefully short for what is realistically required--e.g. field transport to assist extension agents, or the recurrent budget--or else there are bothersome procedural restrictions to overcome. Imagine the difficulties of operating equipment which originated in Japan, India, Italy, Germany, England and the USA when many of these suppliers do not even have in-country representatives. How does one use the "extension" camera when all the lenses have been stolen from inside the office cabinet? Across the whole spectrum of normal daily activity--financial accounting, vehicle logs, "store" inventory, staff disciplinary procedure, etc.--the DAO encounters cumbersome procedural safeguards which do not work well, but which cannot be totally ignored. This further reinforces "personalismo": the senior officer taking departmental resources out of systemic controls in order to use them more flexibly. Of course, once the "extension camera" is stored in the DAO's house, the temptation to put it to private use becomes irresistible.

I suggest that the combination of having personalized day-to-day control by senior officers and conditions of acute scarcity creates a structurally dangerous situation. If officials are scrupulously honest, much of the time resources cannot be used because the DAO is away with the only key. If not, there will be opportunities aplenty when it is uncertain who has what, and then the items simply disappear. We see in Africa strongly hierarchical management systems where, paradoxically, the responsibilities between levels are deliberately obfuscated. The coming and going of staff on training, the unreliability of records (with letters simply "disappearing" from locked file cases), the times when a loaded vehicle must be left out where it is not secure--these and a myriad of like circumstances create tremendous temptation. Once who did what can no longer be reliably verified, personal intervention must be sought all along the line to accomplish even routine actions. It is only a small further step for officials to begin demanding extra compensation for acting, one of the commonest forms of bureaucratic corruption.

The DAO's typical work situation has been reviewed here at some length to suggest that our current forms of training--whether in "management" or in "extension planning"--do not really have much to offer that would improve the DAO's performance. It is true most agricultural field managers had a technical and not managerial background in their pre-service training, but one must doubt whether more "management training" would make much difference.

4) The Contact Staff

Finally, we come to the situations faced by the bottom-level, contact staff (or "access bureaucracy")--the only ones in the large agency structure who deal with farmers and clients on a day-to-day basis. Here the contrast between job requirements and likely performance become almost bizzare. Frequently the field agents have been asked to "extend" technologies which for various reasons did not seem sensible either to themselves or to their clients. When I was doing field research in Kenya farmers often showed me with much laughter the labor intensive method for laying out maize planting which had been recommended to them. Again, at that time the Ministry of Agriculture was telling farmers to plant by March 15 of each year--an average date when the rains should have commenced. Farmers pointed out it made more sense to watch the cloud formations on Mt. Kenya, which usually indicated when there was moisture in the air and it was safe to plant one's precious seed. Or, again, farmers in western Tanzania were being told to plant cotton before their food crops and to spray their low value cotton up to eight times in each growing season. Later, in the mid-1970s, farmers were some times compelled to use chemical fertilizers even in zones where this practice gave no increases in yield.

Few things are more demoralizing to field agents than to be forced into propounding "improvements" in public meetings which neither they nor the farmers attending believe will give greater income. Communication then takes on the quality of a charade, meant to demonstrate participants' loyalty. The greater the hurry at the top, the more likely those at the bottom will get trapped in this kind of "double bind" situation. From the record, it seems a number of the larger "integrated rural development" projects of the mid-1970s experienced this disability. It is also a characteristic vice of socialist regimes, for exactly the same reason: they are in too great hurry to wait for the slow evolution of proven technologies.

Even when there is a suitable technology on hand, how likely is the typical "extension agent" to be effective in promoting it? First, we should note that delays and uncertainties accumulate downwards in any system that is strongly hierarchical. We have already pointed out several times that many of the field agencies are unreliable, so that when farmers need a particular input they are liable to find it unavailable at the time required.

This is most true in the poorer and more remote communities. Such institutional risks are separate and in addition to naturally caused uncertainty (drought, pest outbreaks, diseases). Because they are clearly of human origin, their incidence undercuts the confidence which farmers might otherwise place in the extension workers' promises.

Second, the levels of expertise required for open-ended "problem solving" is in the tropics considerably higher than program designers have allowed for. I once accompanied a class of degree level agronomists to a Kenya peasant farmer's maize field. Between us, we came up with eight equally plausible reasons why the man's crop was doing poorly. Without access to substantially more information and skill than we possessed in the group, it was impossible to render accurate and effective on-farm advice in one of the simplest situations an extension worker faces.

Typically, African peasant farmers must cope with unknown soils, many fungal, viral, and bacterial diseases, extremely variable soil moisture conditions, root nematodes, soil nutrient exhaustion from previous crops, pests of every imaginable kind--army worms, rats, monkeys, baboons, thieves, even locusts--weeds (which sometimes come with poorly screened seed), equipment breakdowns, missing inputs, visiting goats, and prices which may fluctuate 300% over the season. Yet time and time again African governments yield to pressure and appoint half-trained "village workers" with from 6-18 months of mostly classroom instruction. The technical issues that will arise probably necessitate a minimum of about three years solid scientific training, at least in those areas where field workers are expected to service the full range of crops. Yet in actuality the contact workers are the least well trained in the hierarchy whereas the few staff with degree-level background are tied up in the district offices trying to keep the support system in operation.

On the supply side, many LDC systems try to service more communities than they could realistically support with fully equipped and trained staff. As financial stringencies increase--as we predicted earlier they are bound to, given the divergence between the government's goals and the economic base of taxable income--a ministry finds itself step by step retreating into a situation where almost all the money goes directly into staff salaries. By the time one reaches the contact cadre, it is fortunate indeed if they

even possess motorcycles and a few mimeographed "handouts". More typically these days the contact worker is expected to reach his or her 200-1,000 farm families by bicycle--even when bicycle tires are no longer being sold in the local markets. The same workers may be lucky if they can rent a few rooms in some schoolteacher's house, or maybe share their "veterinary laboratory" with the local sub-chief or Party functionary, who soon takes over the one kerosene refrigerator "temporarily" (though kerosene, too, may no longer be on sale). The "extension agent" will be totally cut-off from the flow of technical information, using as a principal reference the tattered remnants of mimeographed notes from agricultural college days. It is therefore not surprizing that some field surveys have found the better educated, younger extension agents show worse morale and poorer job performance: it is these workers who find such conditions most rankling.

In most countries the contact-cadre constitute "invisible men" whose actual skills, motivation, communication behavior, and opinions are rarely studied. Reports that tabulate overall staff numbers, program organization charts, and official policy goals abound: but hardly ever do top managers have access to realistic descriptive information about their increasingly disillusioned and embittered bottom cadres. In my own field-work some years ago I recall my surprize at learning that the bottom cadres often do not see their farmers except during visits by superiors, who are the only ones with access to Landrover transport. Again, it would not have occurred to me that the most frequent reason for travel was the monthly pilgrimage by junior agents to wait around at the district headquarters for their salaries--a pattern found in many rural areas where there are insufficient banking services and the ministry reluctant to make cash deliveries on the spot. To expect field agents working under such constraints to behave in a client-oriented advisory fashion assumed by our US "country agent" model is, quite simply, absurd.

It is also likely that this situation is becoming worse over time. Not only are essentials like fuel and books becoming scarcer, but the cleavage between an emerging, urban-oriented elite and the bottom level staff may be widening. The new generation of African professionals moving into positions of district leadership are oriented upwards, towards friends and colleagues who circulate rapidly from position to position. This makes those stranded in remote field assignments even more jealous, and more determined that if the opportunity arises they, too, will secure a headquarters assignment.

5) Nongovernmental Alternatives

Could the whole issue of reforming public sector agencies be avoided by developing the capacity of nongovernmental alternatives instead? This is a more legitimate question than those of us who have involvement in public sector management have been willing to admit. Take, for instance, the 15 attributes of the "ideal" extension organization which I outline later in this paper (section III.2). A simple matrix tabulating these traits against the likely strengths of various institutional alternatives shows clearly that the private sector firm has a majority of the desired features (Table 3). By virtue of the way it operates, a typical small-scale firm offering services to farmers in an expansive economic environment will be likely to display many of the capacities related to extension effectiveness. So also, though perhaps to a lesser extent, will the private voluntary agency.

However do these theoretical advantages in favor of cost-covering service organization materialize in actual fact when we examine the alternatives in real world African settings? Here we must recognize several aspects of African rural development which distort how organizations behave (public and private). The problematic aspects are:

- When the agricultural sector is dominated by smallholders who still produce most of their own food, commercial turnover is small and erratic. In such an economic environment, the market for agricultural services is seasonal and tightly constrained. Private firms may be quite reluctant to enter it, unless they can find ways to exert a de facto monopoly. Such behavior undercuts the theoretical advantages which private sector operations are supposed to possess. We see similar "perversities" in regard to exchange of information and circulation of benefits. Firms may find it in their interest to become excessively secretive, and to confine benefits to particular clients.
- In initial stages of commercialization, reciprocal exchange mechanisms are probably more cost effective than market-price based exchange. Certainly the outstanding examples of low-cost rural marketing comes from Asian or Chinese family businesses, where both internal transfers and client services are in large degree reciprocally governed. The efficiency of such "bush" businesses is not freely transferable within the commercial sector, and may not be found in market-price based institutions. Reciprocal exchange depends upon continuing social relationships which are culturally reinforced, and often particular to certain groups or particular exchange institutions. (Here see Hayami & Kikuchi 1981).
- African countries often lack middle-sized businesses, those with the capacity to serve a district's needs, for example. At the top end of the scale we have the "enclave" trading houses. Some represent large multinational firms, others the mercantile capital of the former colonial power. In neither case will they have much direct interest

Table 3. Likely Organizational Attributes

| ESSENTIAL REQUISITES: | TYPE OF ORGANIZATION: | | | | | |
|---|-----------------------|--------------------|-------------------------|-------------|-----------------------|----------------------|
| | private firm | land grant college | ministry of agriculture | para-statal | enclave donor project | farmers co-operative |
| 1. Clear objectives | 3 | 2-3 | 0-1 | 1-2 | 2-3 | 1-2 |
| 2. Find & hold good staff | 3 | 3 | 1-2 | 2-3 | 2 | 0-1 |
| 3. Action oriented | 3 | 1-2 | 0-1 | 2-3 | 3 | 1-3 |
| 4. High payoff technology | var. 0-3 | var. 0-3 | var. 0-3 | var. 0-3 | var. 0-3 | var. 0-3 |
| 5. Performance managed | 3 | 2 | 0-1 | 1-2 | 2-3 | 1-2 |
| 6. Teamwork at base level | 2-3 | var. 1-3 | 0-1 | var. 1-3 | var. 1-3 | 2-3 |
| 7. Realistic job demands | 2-3 | 2 | 0-2 | 2-3 | 2-3 | 3 |
| 8. Means to co-ordinate inter agency matrix | 2 | 0-1 | 0-1 | 1-2 | 0-1 | 0-1 |
| 9. Staff downwardly accountable | 2-3 | 0-1 | 0-1 | 0-1 | 0-1 | 2-3 |
| 10. Rapid information circulation | var. 1-3 | 2-3 | 1-2 | var. 1-3 | var. 1-3 | 1-2 |
| 11. Organizational myth/commitment | 3 | var. 1-3 | 0-1 | var. 1-3 | var. 0-3 | 1-2 |
| 12. Access to tech. expertise | var. 0-3 | 3 | var. 1-3 | 2-3 | 2-3 | var. 0-2 |
| 13. Freedom from political interference | 2-3 | 2-3 | var. 0-2 | var. 0-2 | 2-3 | var. 0-2 |

KEY
 0 = very poor/weak
 1 = poor/weak
 2 = moderate
 3 = strong/good
 var. = variable

These are merely rough judgemental estimates of the likelihood that a given requisite would be found under typical African conditions

in offering services to non-monetized, high-risk peasant farming. At the other extreme will be indigenous entrepreneurs who run small, multi-product businesses with absolutely minimum overhead investments. In between will come the immigrant traders, with better transport and facilities than indigenous businessmen but also less political security. Often the commercial sector is sharply polarized into the two extremes, without the type of middle-sized, service oriented firms which US farmers enjoy (and US advisors presume upon).

- The technological capacity of the small-sized firms is often extremely weak, duplicating the unreliability of public sector institutions. Farmers in turn are relatively passive in regard to new technological opportunities which have not yet been introduced into the immediate environment. Many of the key extension innovations are of a non-proprietary nature, where even if a firm does well it risks being easily displaced (perhaps for political reasons).
- At the national level, the market for new technologies is still relatively small. Their non-proprietary nature makes this unattractive for multinational firms, which in any case find the delays of intergovernmental negotiation, licensing requirements, credit arrangements, etc. quite costly. US firms tend to expect immediate results, and lack the patience required for developing longer term technology transfers (this from research by Negandhi and others on differences between US and European managers). When multinationals do enter African markets, they often come with staff who are leftovers from the colonial period or else too young and inexperienced to obtain better jobs. It is ironic that the "exports" which the private sector can supply to Africa are the precise equivalents of local public sector employees--rootless young men who shift their assignments frequently.
- The private sector is not impervious to the larger trends in the economy. If foreign exchange is scarce, often the private sector is excluded and must meet its needs outside official channels. Private firms may devote their major efforts to building up external holdings, and so show little interest in long-run local investments. Workers may adopt the public sector work norms, even when employed in the private sector.

What these observations suggest is that in Africa the commercial provision of services to farmers shares many of the same inefficiencies or problems which the public sector institutions face. It is in addition greatly influenced by political sensitivities towards the immigrant traders and businessmen. In short, we cannot assume that the theoretical attractiveness of private sector service provision will be in fact encountered.

If so, there is a case for giving greater attention to the whole non-governmental sector rather than just to private firms. The major alternative institutions one might consider are presented in Table 4 overleaf. These are all smaller than the typical public agency or ministry, being "bottom-up"

| <u>Type of Organizations</u> | <u>Potential Functions:</u> | <u>Barriers:</u> | <u>Feasibility in Africa?</u> |
|------------------------------|--|---|--|
| 1. Private sector program | Technical expertise Loan financing Project planning Legal/procedural assistance | Long time horizon generally not acceptable to smaller firms or in risky nations Heavily depends on agency having donor willing to absorb initial costs | Yes in regard to SAHEL & various Francophone agencies of this type Maybe in regard to large-scale estate production (linked CD type projects) |
| 2. Contract services | Seed supply Fertilizers & inputs Extension materials Management training Soil testing Disease diagnosis Contract ploughing | Heavily depends upon cash flow in community Less attractive where technology is non-proprietary Sensitive to backwash of more attractive investments in environment | Yes for tractor services & inputs <u>until</u> PE scarce, then no Not so feasible on the hi-tech end (A-I, etc.) |
| 3. Voluntary agency networks | Extension advice Experimental cropping systems Small-scale training P t extension materials Famine relief | Often associated with religious sponsorship Sometimes locally sensitive Weak on technological backstopping | Yes, but more so in non-Muslim areas Non-religious NGOs such as OXFAM have strong record in Africa |
| 4. Private Foundations | Personal services Pilot programs Conferences, student exchanges, etc. | Funding limitations Language barriers for work in Arabic/Portuguese areas | Yes, highly effective in the past (Ford, RF) |
| 5. Indigenous entrepreneurs | Contract ploughing Small-scale construction | Weak in technical areas Inadequate capitalization Immigrants or major tribe | Yes, <u>if not immigrants</u> |
| 6. Community Leadership | Self-help projects Clubs, groupwork Youth projects | Unable to finance recurrent expenses, liable to capture by elites, part-time nature | Yes, but more success if community has enough cashflow |

rather than "top-down" institutions in terms of their rationale and customary modes of operation. This does not automatically make them into efficient, client-centered organizations, but it helps. (For a discussion of the potential conflict between these two approach ideologies, see Moris 1981:92-98).

Most private sector development programs in Africa are run by voluntary agencies, which have a long history of public service involvement on the continent. One thinks immediately of OXFAM's many small rural projects, but there are also a diversity of religious organizations involved in agricultural development. Here a comparison to Latin American programs might be useful, for example to the three cases described in the Inter-American Foundation's publication They Know How: An Experiment in Development Assistance (1977). A model of how private support can be mobilized is provided by Coordination Rural A.C. (CRAC) in Mexico City, which had its beginnings in 1966 from USAID's support to Simon Williams. CRAC is a private, non-profit corporation which employs a small team of specialists to work with local communities in formulating and financing farmer-owned rural development enterprises. Its largest project as of 1976 was the founding of Fomentadora Rural, S.A. de C.V. (FORUSA), which managed about 3,000 ha in 10 communities of the State of Jalisco (450 farmers as members).¹ A somewhat comparable African program was implemented by Shell at Uboma in Nigeria, modelled on a long-standing Shell pilot project at Borgo a Mozzano in Italy.² What these examples show is that where a large commercial firm has a long term interest in a particular country, one does sometimes see on a modest scale the kinds of development initiatives which we normally associate with public sector support. Unfortunately, US firms tend these days to have more concern for "bottom line" profits; except perhaps for certain parts of Latin America, the US commercial sector is not a likely candidate for major development assistance--and particularly not so in turbulent policy environments such as we encounter within Africa.

There does seem to be greater scope for commercial involvement in the technical "backstopping" of technology transfer activities. For example, the Francophone African countries have for many years purchased extension support externally from the African Institute for Economic and Social Development.³

¹Information supplied by Simon Williams, CRAC's former general manager.

²See L.E. Virone (1970) "Borgo a Mozzano and other similar projects in rural development sponsored by Shell Companies," pp. 323-36. In, A. Bunting (ed.), Change in Agriculture. London: Gerald Duckworth. This volume contains several other chapters on private sector commodity-development programs.

³See P. Dubin (1976) "Farmer-training in Africa: the work of INADES-formation, 1976 Training for agriculture and rural development. Rome: FAO, pp. 36-43.

INADES as described in the literature is not itself a commercial firm, but the way it functions as an intermediary organization linking up national extension services to external sources of assistance is a possible model for how donor funding could be used to get greater small-scale private involvement. INADES is mainly a training organization, providing teaching materials and other back-up assistance to field extension agencies in the Francophone region. Its materials have been of sufficiently high quality for translation and adoption within FAO, and they have also been translated into a number of the African vernaculars (for Ethiopia, Rwanda, Burundi, Zaire and Upper Volta).

The underlying constraint to commercial sector support is the essentially non-proprietary nature of this technology. In effect, this means that the public sector must first provide stable cash flows into such activities before one can expect private sector response. Even then, the response will probably be of a short-term, ad hoc nature rather than being durable and long-term involvement. Nevertheless one can foresee a large scope for commercialized activity in the area of media materials production (videotapes, textbooks, microprocessor software). Here India's various extension programs might serve as a model of how public funding can also stimulate local commercial involvement in technology transfer.

The US foundations (primarily Ford and Rockefeller, but to a lesser extent the Afro-American Institute and some voluntary agencies) have been in my judgment very effective within African rural development, playing here the role which the Agricultural Development Council and IRRI have in Asia. The foundations seem to have far better success than the larger donors in attracting strong talent and in keeping such staff in post working flexibly on new emphases and needs as they arise. Of course, much of the initial Ford and Rockefeller support was linked to African university development--and perhaps this was one reason for its impact. As major donors move towards even larger field programs--which have a generally dismal record of actual achievement in Africa--the need for some counter-balancing personal services type assistance grows. We should recognize, however, that US foundations have themselves cut back on LDC assistance and find their own resources very thinly spread now that so many countries want aid.

Perhaps the most significant change which has begun to occur in Africa is to recognize the legitimacy of private-sector involvement in rural development. Some African leaders now recognize how important private sector competition can be in keeping public agencies more cost conscious. What we need is to incorporate this realization into public sector processes, by opening our planning forums to outside participation and by drawing in all available expertise public or private.

4. Second Generation Approaches to Rural Development

The list of discarded "solutions" which technical assistance has sponsored over the past two decades makes sobering reading. We began the 1960s with mechanization, land settlement, river basin authorities, land reform, co-operatives, community development, and--in Asia, at least--large scale irrigation. At the same time, a large amount of investment in the new nations which were gaining their independence in the mid-1960s was upon "institution building": agricultural universities (in India), institutes of public administration and management, extension agencies, credit agencies, and the like. This first generation of rural development programs was both expensive and ineffective. By the late 1960s several observations about the first decades' investments seemed clear:

- Mass education was beginning to produce more youth than higher education would be able to absorb, so that an acute "school leaver" problem would arrive in the 1970s.
- Free choice of industrial technology at the proximate level of the individual firm was tending towards inappropriate, capital intensive technologies being purchased "off the shelf" from western nations where labor displacing mechanization was already far advanced.
- The official agencies which had been created to serve agriculture had with additional growth become strongly hierarchical, self-protective bureaucracies. Such institutions one might predict would be relatively ineffective in sponsoring the diffusion of new technologies among farmers.
- The agricultural technologies themselves being promoted through contact with "progressive farmers" and expansion of export crop production were benefitting primarily the already commercialized, larger farmers.
- Coordinated effort to attack several bottlenecks simultaneously was needed before more intensive peasant farming would be profitable. Single focus measures on only one problem area at a time did not lead to the breakthrough which had been expected in smallholder farming.
- Rapid population growth occasioned mostly by the spread of modern sanitation and lowered death rates for infants was likely to absorb most of the gains in agricultural productivity.

In response to these perceptions, several "new emphases" (or second generation) programs were introduced. For convenience, these can be clustered into two groups, the first predominating in the early 1970s and the second from the mid-1970s onwards. In the early 1970s, the main thrusts were upon: i) nonformal education, as a corrective to the overly bureaucratized "extension and training" approaches of the 1960s; ii) the "intermediate" (and then)/"appropriate" technology movement, to introduce considerations of employment and support into the choice of technologies;

iii) establishment of vertically organized cash crop authorities (parastatals); iv) downplaying of macro economic planning in favor of project appraisal and detailed project planning; v) intensive agricultural research to find high yielding varieties which were combined with fertilizer application and water delivery systems under the "green revolution"; and vi) expansion of the "package" approach to technology transfer (e.g. IDAP in India or CADU in Ethiopia) into multi-sectoral, multi-level "integrated rural development programs" (or IRDs). By the mid-1970s it seemed clear that even these corrective measures were insufficient to meet the needs of the entire rural population or to counterbalance perverse tendencies inherent in uncontrolled economic growth. For the first time, field studies were becoming available which actually measured the variables economists had been theorizing about so grandly. They showed clearly that regional imbalances were growing, that many rural households still could not count upon receiving the most rudimentary services (which were easily within our technological capacity to deliver universally), that a technocratic bias rendered some forms of rural assistance ineffective (e.g. curative medicine where preventative health measures would have been far more cost/effective), that technological practices had to be selected to fit the larger farming systems, and that women and minorities were being systematically excluded from many benefits. These realizations implied that unless further changes were made in how development assistance was being delivered it would not forestall the gradual emergence of a radically polarized rural class system. The countervailing emphases of the late 1970s were, therefore: i) "basic needs" for the poor, ii) women-in-development (or WID), iii) regional planning, iv) household water supplies, v) community and holistic medicine/nutrition approaches, and, vi) farming systems research (or FSR). Now, in the early 1980s, we have added to these a concern with natural resources (social forestry and fisheries), the T & V system to refurbish mainline extension agencies, more attention to price policy (especially in regard to the food sector), participatory bureaucracy, an interest in strengthening institutional capacities, and renewed interest in managing water and irrigation systems.

The above listing is by no means exhaustive. What it does indicate is that programmatic emphases are subject to displacement after a relatively short time when they are in fashion. It also suggests that earlier emphases may still be desirable and necessary as preconditions for the success of later objectives-- e.g. the extension function underlies the ability to diffuse higher yielding varieties. Since this paper specifically concerns how to draw upon extension organizations for technology transfer, our review here will concentrate upon the approaches most directly aimed at improving agricultural productivity.

1) Transfer of Successful Models

Early US technical assistance (1955-65) often had as its goal "institution building": the transfer of an already successful US organizational model into an LDC context. Examples would be India's Domodar Valley Corporation (modelled on the TVA), USAID's construction of agricultural universities in India (the land-grant college pattern), or the introduction of 4-K Clubs into Kenya (by 4-H advisors). When direct organizational transplants from the USA seemed inappropriate, attention turned to the successful LDC agencies as potential models which other countries could adopt. The early CIMMYT and IRRI successes are undoubtedly behind the proliferation of international research institutes during the past decade. Again, Ethiopia's CADU and WADU projects were designed by Swedish experts as copies of the highly regarded Comilla Project in Bangladesh (though incorporating 'input packages' as an added element). The KTDA in Kenya served as the model for similarly organized Tea Authorities in Uganda, Tanzania, and Malawi... And so it goes. A recent and useful study which identifies the most promising international "successes" is Samuel Paul's Managing Development Programs (1982).

On a more modest scale, the same process of organizational replication can occur within a country, e.g. the spread of Youth Brigades into different parts of Botswana or dairy co-operatives throughout much of India. In the mid-1960s, we observed how the Nwea Scheme's irrigation system was taken over by the National Irrigation Board in Kenya and made the model for all the Board's irrigation schemes.

This idea seems so sensible as a point of departure for choosing development policies, it seems almost shameful to question its utility. Nonetheless, the fact must be faced that Africa has not been kind to efforts of this nature. WADU and CADU absorbed a tremendous input of Scandinavian aid without achieving anything like Comilla's Asian success. IITA, ILCA, and ILRAD have not revolutionized African agriculture to nearly the same extent as IRRI and CIMMYT did in Philippine and Indian farming. Nor has IITA's contractual assistance to other African research institutions (such as Tanzania's Ilonga Research Station) proven anything out of the ordinary. Sudan's Gezira model when taken over into large-scale irrigation within Mali and Niger produced huge rice schemes whose size was matched by their losses.

The Uganda and Tanzania Tea Authorities have been hardly able to repay their own expenses, even though the KTDA across the border continues to be cited as a model of how an agricultural parastatal should be run (here see Lamb & Muller 1982). Kenya's Mwea system which was a glamor story in the early 1970s can now achieve only mediocre results and is under investigation to find ways of restoring its productivity.

What analytic reasons might explain why these "success models" have not travelled well?

- i) In every one of the cases cited, the original institutions evolved slowly and were not initially seen as being especially successful. Often also the institution received intense effort and support of one or two gifted individuals who remained with the program for a long span of time, e.g. A. Khan at Comilla or Norm Borlaug and Ed Wellhausen of CIMMYT. This personal factor is, of course, the one thing which does not get transferred along with the model. Thus while the components may have been carefully designed in their initial setting, in the new location the designer is not present to screen out inappropriate elements or to make necessary modifications.
- ii) In the new location, there has usually been greater urgency, the pressure to implement all components at once. One now tries to accomplish in two years that it may have required ten in the initial instance. The loss of detailed and sequential preparation is accompanied by a diminution of personal contact. Internally, program activities are not closely supervised.
- iii) Generally where the transfer of models crosses national borders there will have been no opportunity for new staff to work with and under the ones who developed the original program. This cuts new projects off from what is probably the most effective mechanism for organizational transfer: a "seedbed" approach wherein new staff are cycled through the successful, older unit.
- iv) There seems to be something intrinsic to "copycat" exercises which militates against considering the model's elements individually and critically. Often those doing the transfer become overly impressed by the reputation of success achieved by the parent organization. They fail to identify analytically how and why the model works in its initial setting.
- v) It also seems that the worsening economic situation for African primary producers--e.g. rising equipment costs, input scarcities, stagnant or declining cash crop prices, the widespread evasion of official marketing channels--cripples new large-scale agencies at the initial stages when managerial optimism is so essential. Analysts have been slow to recognize that the "success" decade in African administration, roughly 1963-1973, was a time with better weather and prices. New organizations today face much tighter constraints.
- vi) Finally, there is little doubt but that African agencies get "out of hand" at an earlier stage than planners anticipated. Sometimes things go wrong even before the initial equipment is paid for, so that the World Bank will be called in to refinance projects that are hardly 6-7 years old. The evidences of malfunctioning within projects are the same traits found throughout the national system (which we have discussed earlier). It seems that the problematic features of African management are strong enough to overpower all but the most concerted agency efforts.

2) Creation of New Parastatals

The usual format for a transfer of institutional models was to constitute the new agency as an independent entity, legally separate from the pre-existing ministries and boards. The enabling legislation typically gave the new institution the power to recruit its own staff and operate outside usual civil service regulations, particularly in regard to control of its own finances and equipment. In short, most long-run development projects have been constituted into public corporations rather similar to the TVA. Called "quangos" (for "quasi-governmental organizations") in England, where there are over a 1,000 of them, these are generally known in LDCs as "parastatals". It is not unusual for the typical LDC to have 150-300 of them, spanning the whole range of development services.

The strengths of the parastatal format are exactly those provisions which exempt it from the overly rigid corpus of civil service regulations. Herein lies the danger, if a parastatal is created within a larger system where tight administration is not common. Without efficient management and tight controls, the public corporation can easily slide into all sorts of administrative excess: nepotism, favoritism, overmanning, etc.--some of the very excesses which civil service regulations try to inhibit. The weaknesses become amplified in socialist-oriented countries where in aggregate the public sector employment far outweighs the private sector opportunities. In such economies, the unproductive work norms which cripple government ministries get taken over uncritically as the standard for parastatal organizations as well. This situation leaves the organization with the worst of both worlds: an absence of civil service controls but the presence of civil service inefficiency.

Public corporations in Africa sometimes began well--Killick cites the Volta River Authority in Ghana as a "success" story--but these days have become notorious for weak economic performance (Killick 1978:214-262). The faults are widely recognized, being reported again and again from country after country:

- Heavy investment in modern plant and equipment which because of insufficient raw materials, equipment breakdowns, shortages of parts, etc. is typically used at under 50% of capacity.
- Persistent overmanning, which results when staffing is geared to optimistic projections of output which never actually materialize.

- Bad location of component units, so that power outages or high transport costs or excessive spoilage foredooms the whole enterprise to high unit costs.
- Unclear, multiple, and contradictory objectives which are imposed externally by political authorities (who feel this perfectly legitimate since the institution is created by public investment).
- "Premature professionalism" which results when highly educated young managers are made the supervisors over staff without education but having long experience.
- Capture of fringe benefits by workers and management, who soon expect the organization to supply medical, transport, housing, and recreational services not available in the surrounding community.
- Achievement of monopoly control over given functions by statute of law, thereby further diminishing the pressure to keep costs under control.
- Rapid expansion in capacity justified in terms of "economies of scale" which in fact do not materialize.

Even this partial listing of parastatal faults is enough to make it clear why most parastatals incur high costs. If we then superimpose the present international decline in commodity prices and all the other economic dislocations, the situation of the typical LDC parastatal can rapidly become untenable.

US advisors have relatively little useful advice to offer on such matters. A background in free-enterprise theory makes most US economists hostile to the very idea of public corporations, and insensitive to the devastating impact on the non-OPEC African nations of the slowly deteriorating terms of trade affecting the primary foreign exchange earners like coffee, tea, and tobacco. We also tend to interpret instances of mismanagement as being the personal faults of individual managers--an assessment with which African political leaders heartily agree. Thus, by implication, corrective actions should either involve injecting more "high level" manpower into the system, or making existing staff "toughen up": again, a diagnosis which the leadership finds quite acceptable.

The truth is rather more complex. Parastatal mismanagement has no single cause. It is the product of managerial culture built-up throughout the economic system. Take, for instance, the concept advanced by Young and his students of "premature professionalism" (1981). Earlier analysts have blamed the low performance of cooperatives on too much bureaucratiza-

tion, an excessive rigidity of managerial functions which accompanied the 'top down' formation of new cooperatives by administrative fiat. This seemed a plausible explanation, since many authors have noted that heavy handed government interference depresses co-op morale and efficiency. When however Young and his students actually observed what Uganda Co-operative Department staff did in the field, they found that "bureaucratic rigidity" was more apparent than real. What actually happens--and I suggest this story is repeated hundreds of times in agency after agency throughout Africa--is that bright, young officials are appointed who hold specialized degrees but little on-the-job experience. Since their training will be at best tangentially related to the particulars of co-operative management, such staff make decisions which are in fact capricious and often ineffective. Yet the individuals responsible are proud to be "upholding standards" and "improving efficiency". The routines which hold down costs are not followed, but the managers lack the operational experience to devise alternatives. The co-operative movement finds itself saddled with overeducated young managers who draw high salaries but do not in actual fact insist upon the routines which would stimulate production. The very investments the Uganda government has made in hopes of strengthening managerial performance paradoxically destroy it--and those doing the damage sincerely believe they are acting professionally and in the public interest!

Another problem throughout Africa is direct political interference in daily operations. Often such interference is motivated by other, urgent problems: the national bus service may be pressed into moving overdue fertilizer instead of passengers. The examples of this kind are legion. The veterinarian's housing and laboratory refrigerator will be on "temporary" loan to the hospital; the water project's grader will be preparing the public roads for a presidential visit; and so forth. In an environment already plagued by delays and unreliability, such interventions no matter how well intended (to "speed" rural development) do paradoxically increase the aggregate levels of systemic malfunctioning. Because agricultural equipment and resources often lie idle during the slack season, they are especially prone to political redirection. The rationale on political leaders' part is that since parastatals are formed with public capital, their managers should be willing to shoulder externalized costs when required by proximate circumstances to do so.

US advisors also have trouble taking seriously the political pressure which created parastatals in the first place and which continues to support their expansion despite adverse economic circumstances. Within East and West African nations, it should be remembered that the "traditional" trader was usually an immigrant--Lebanese and Asians in commerce; Arabs, Somalis, and Sudanese in "bush" trading. In most African states, there was no indigenous middle class available to take over commercial functions, so that public corporations for running railroads, telephones, and crop handling boards were inevitable. The fear of domination by immigrant traders has today diminished. Probably this lies behind the willingness of heads of state like Moi or Nyerere to commit themselves to a policy of moving away from parastatals.

The reform measures outlined in this review are based on the opposite presupposition: not only will African parastatals persist, the total number will continue to climb. Why? First, once the larger share of desirable employment lies in the public sector, a government will find itself under great pressure to provide jobs for many individuals who in a market economy would look instead to the private sector. At the top, there are always restless generals, disgraced ministers, ex-diplomats, and other party functionaries whom a head of state may have good reason to keep out of active politics. At the middle levels, parastatals offer better benefits than equivalent ministry positions, and more scope for showing initiative. If there is a vigorous private sector, the national leadership will find it even more essential to protect parastatal benefits as the principal means for retaining capable managers in office. And at the lower levels, because parastatals are under public control they can be pressured into employing the output of the burgeoning system of higher education: ministry diploma courses, polytechnics, teacher training colleges, agricultural institutes, and universities.

A second source of pressure has been the donors, who typically demand special enabling legislation to protect their control over any large development project. Sometimes this was not at first the case. However only a short acquaintance with the difficulties of operation when management does not control staff recruitment, finances, or equipment soon brings about a shift to parastatal status. I see little evidence that donors will agree to work within present agency structures

in the future, at least not in regard to large projects. It should be recognized that the pressure to establish autonomous agencies grows as the inefficiency of existing agencies rises. A donor which in principle opposes the further creation of parastatals will nevertheless insist on this format for its own projects precisely because the existing institutions perform so poorly. Any experienced manager realizes it is easier to start fresh than to reform an already malfunctioning organization.

The third reason originates with the managers themselves. Take for the moment an important export crop like coffee or tea, whose output depends upon a chain of contributory services (soil testing, fungicides, crop financing, varietal development, etc.), all under separate agencies. This situation does not appear problematic to a DC manager, who can assume telephones work, letters arrive, and agreed services will be performed on schedule. Imagine now instead the LDC manager, who from past experience knows there will be numerous delays, breakdowns, missing inputs and parts, misdiagnoses, agreements which are forgotten, etc. The astute LDC manager learns that each influenceable component requires extra inputs of energy, interventions, and leverage beyond the simple fact of arranging a commitment. Such "bird dogging" is all the more wearisome because it must be personally applied and must be repeated for each necessary operation. A capable manager may exert such efforts during one or two cycles of crop production, but will soon decide it would be far more efficient to control the whole process directly. It is, therefore, the general unreliability of inter-organizational matrices within African countries which make the better managers themselves the prime advocates for establishing vertically coordinated cash crop authorities.

Here it is illuminating to employ Smith and Lethem's distinction between "controlled," "influenceable" and "relevant but uninfluenceable" factors in the decision-maker's environment (1980). Despite the general policy decision which an African government may have reached to limit the further addition of parastatals, in the particular circumstances where real decisions arise those responsible will feel obligated to establish new institutions even when they recognize these "exceptions" will further strain the nation's resources. Because parastatals offer increased control over the factors that matter most to African leaders, we should expect that this sector will continue to proliferate no matter what is official policy.

3) Transfer of Technology (HYVs)

In the late 1960s, a different strategy for rural development evolved, which aimed not so much at transferring institutions as at finding suitable technologies which might revolutionize farm yields. Specifically, it was the Rockefeller financed programs in Mexico (which became CIMMYT) and later in the Philippines (IRRI) and India for wheat, maize, and rice which showed that on occasion crop yields could be boosted between 50-300% by new varieties coupled to timely application of fertilizer and irrigation (Stakman et al. 1967). Now known under the label of the "green revolution" or simply HYVs (high yielding varieties), this approach substituted the exploitation of organic plant responses for the earlier 1950s emphasis upon farm mechanization. It was claimed the new approach was scale neutral, i.e. it benefitted small farmers as much as large ones.¹ The intensive on-farm water management which this approach presupposed suited the smallholder rice farming systems of Asia in the densely settled wet rice areas of Taiwan, the Philippines, and Indonesia. Dwarf but high yielding wheat varieties revolutionized farm yields in northern India's Punjab plain, as did IRRI's varieties for Philippine farmers' rice yields.

Underlying the whole approach was the premise that technological short-cuts exist, so that the benefits of decades of agronomic research in one setting might be quickly transferred and made available to farmers somewhere else. There is no doubt whatsoever but that rapid and effective technology transfers do sometimes occur. Many US staple foods originated on other continents, sometimes under very different conditions. Most of Eastern Africa relies on maize as its staple, yet corn is in many areas a comparatively recent introduction. The Hereford breed, like the Black Angus which is replacing it, was developed in the cool, wet climate of the British Isles but has thrived in the semi-arid American West. The hope has been that perhaps by initiating an exchange of 'organic capital' of this nature the poorer nations could bypass years of adaptive research and tap state-of-the-art technologies from donor nations.

¹ There is a large and generally high quality literature on the impact of HYVs within the farming and economic systems. See Chattopadhyay (1977), Critchfield (1983), Dalrymple (1975), Dasgupta (1977), Farmer (1977), Hayami & Kikuchi (1981), Hewitt (1976), Palmer (1976), Pearse (1978, 1980), Shand (1973) and Wong (1979). For an overview, see Berry & Cline (1979).

The shift from resource-intensive strategies (land clearing, mechanization, etc.) to a technology-intensive strategy is on the face of it an attractive option for African nations to consider. In Africa, good arable land is already scarce in the areas of densest population concentrations (even though, paradoxically, the average utilization of land is very low in comparison with Asia). Neither mechanization nor large-scale irrigation has been successful, and both require vast amounts of capital which the continent could profitably use for other, more cost-effective purposes. Most African nations already have some kind of research or experiment station network, so that a technology-intensive approach would not require beginning from scratch. It seemed that by coupling these existing research institutions to the newly created network of international centers (the ISNAR/CA clusters) dramatically greater results might be achieved from a modest additional investment. More recently, under new US copyright provisions the hope is sometimes expressed that perhaps multinational firms could play a similar role vis-a-vis private agricultural services, revitalizing the private sector contribution to African development. How realistic are these hopes?

When assessing the potential and actual performance of "green revolution" strategies, two separate issues must be distinguished analytically. First, to what extent is the HYV promise actually a realistic technological possibility in a given setting? Second, what demands does this set of measures impose upon the participating administrative agencies and the surrounding network of support institutions?

In regard to the first issue, it was suggested earlier that the potential for dramatic HYV technology transfers is substantially less in Africa than was at first anticipated. There have been a few success stories (but it is notable that IIATA in Nigeria is not one of them). Sprague's USDA sponsored assistance to Kenya's national maize program has already come up several times in our discussion: the jump from 19 to 80 bushels per acre was, indeed, spectacular (Sprague 1970:94).¹ But as more information has come in covering the

¹It is significant that by Sprague's figures, of this increase only 5 bushels/acre was the result of fertilizer application--an amount insufficient to repay its costs.

wider spectrum of crops and conditions, agronomists have been forced to become more pessimistic. Here I should warn that my own access to published sources on this topic is woefully inadequate. However, based on field visits within East Africa over the past decade, certain generalizations suggest themselves:

- A main constraint in Africa is the highly seasonal nature of water supplies. This when coupled with soil distributions means that there is at best only a modest potential for increased irrigation--sometimes no potential at all. To a greater extent that analysts have recognized, Asia's "success stories" come out of particular geographic situations where the supplies of water could be rapidly augmented.¹ Take away improved on-farm water management and the associated movement to double and triple cropping, and the HYVs lose much of their attractiveness (if not even their technical feasibility).
- In regard to rice production, while IARI varieties do sometimes perform well there are already local types which give equivalent yields or have more desirable consumer traits.
- In regard to maize, the HYVs have sometimes shown themselves extremely susceptible to streak virus and in general the combination of low on-farm prices, bad fertilizer recommendations, and high risks have severely depressed adoption.
- Maize has become the preferred staple over most of Eastern and Southern Africa. Because of its susceptibility to drought and to viruses, it probably increases farmers' vulnerability to food deficits.
- Outside of the northern and southern extremes of the continent, wheat has little potential and tends to be grown under energy intensive methods, making it a net foreign exchange loss.
- There are promising legumes and root crops, but these seem to be highly adapted to particular locales and so cannot be easily transferred. The existing research base on many of these crops is also very weak.
- Introduced plant and animals species have often been grown in Africa but tend to fail when subjected to the typical managerial or situational constraints which local species compete against.
- Livestock in Africa suffer from many endemic diseases and must cope with pronounced nutritional and heat stress for extended periods. The existing system appears to give as high a biomass per land unit as any known technical alternatives, a superiority which was masked to researchers because they measured instead weight gains per animal. In the context of present environmental constraints, African livestock show good performance.

¹It seems this same observation applies also to the drier parts of Asia which lie away from major rivers or good subsurface water. Here see

It seems we face therefore several reasons why Africa's technology transfer programs have not been as successful as yield increases indicate might be achieved. The four principal bottlenecks which I see are:

i) In many instances yield improvements are masked by multiple constraints. Correcting for a single factor--say Nitrogen deficiency, for example--simply reveals the presence of other, equally limiting factors. This "overlaying" of constraints explains why benefits from a single innovation are either masked or else last for only a short time.

ii) The lack of response seems particularly characteristic of the lower altitude zones where environmental stresses--drought, diseases, leached soils--are greatest. Eastern and Southern Africa with upland plateaus or perhaps volcanic soils (e.g. Kenya or Ethiopia) are partial exceptions--and have been the "success" stories. Elsewhere though most of Africa's cropland lies within a zone subjected to severe environmental constraints. I am told by those working in comparable zones of Latin America that they, too, have found the low altitude zone more difficult, e.g. Northeast Brazil.

iii) There is a substantial underexploited genetic potential in some of Africa's legumes and food crops (see Goering's review of cassava potential, 1979, and the crop by crop assessment in Wortman & Cummings, 1978:144-185). Here however the difficulty is that either we have a subsistence crop for which there is insufficient monetized demand or, more commonly, a high yielding crop which requires scarce inputs such as timely application of insecticides. While agricultural research stations in Africa can usually obtain insecticides when they are needed, farmers cannot. With the various legumes the availability of insecticides makes an enormous difference upon effective crop yields.

iv) Finally, the recommendations themselves are often suspect. Africa's research institutes have been very slow to screen technical recommendations against the factors which matter most to farmers. Yield increases taken out of context tell one very little about actual potential. For example, Gathee (in Kenya's Grain Legume Project) found that when labor requirements were considered, the Ministry's "recommended" practices took 5.5 times as much labor at the critical planting time as did farmers' own practices (1982:137). The alleged yield superiority of "improved" technologies often vanishes when one introduces realistic labor, risk, and input availability constraints into the evaluation. This is such a widespread weakness in African research recommendations that I remain very sceptical concerning the higher yields being claimed.

Of course, such difficulties are not insurmountable and there may exist major untapped yield increases within the indigenous species or some of India's food crops (Leakey & Willis 1977). However in the immediate future the conclusion seems inescapable that we are unlikely to find quick and easy "technological fixes" to make local adaptive research unnecessary. In the African context, HYVs are going to require vigorous and continuing research and extension support.

This introduces our second issue, the question of the quality of institutional support which technology transfer programs can expect. The "green revolution" components are not particularly novel in the African context. What is "new" is the realization that to be effective they must be jointly applied, on time, in sequence, and must be carried through to completion. The hidden side of technology transfer is therefore an implicit presumption that the required services can be reliably delivered at the local level, or, if not, that yield increases will be so spectacular that in a short time commercial suppliers will materialize. African farmers (and their ministry-supported extension services) typically encounter late fertilizer delivery, incorrect recommendations, ineffective or unavailable insecticides, unreliable water delivery, unrealistic product prices, poor transport, and insufficient storage--the very qualities which nullify the effectiveness of the strategy.

Research scientists have not comprehended that a technology-intensive program will usually also be organization-intensive. The enormous benefits which seemed to accompany particular innovations on the research farm made proponents of technology transfer blind to complexity of the associated support systems. Americans, particularly, take the reliability of support systems for granted and so are prone to recommend new technologies which far exceed average administrative capabilities within the client system. Furthermore, as African nations experience greater economic difficulties their leaders are taking steps which make the local support network even more unreliable than it was a decade ago. Yet the research scientists continue to produce recommendations that depend upon easy access to insecticides, herbicides, fuel, and equipment.

It would be pleasant to report at this juncture that these various weaknesses in "classical" agronomic research are being cured through the Farming Systems Research (FRS) which USAID, CIDA, and other donors have been promoting. In truth, I cannot: FSR in its present form and as being implemented in African countries is a deeply flawed approach. In very broad brush outline (which is undoubtedly unfair to some FSR projects but nonetheless generally true), FSR's weaknesses include:

- A basic failure to recognize the sociology of team effort at the research station itself, and in regard to relationships between the station and its parent ministry. The danger here is that FSR "experts" become an additional enclave within an existing enclave, intensifying jealousies all round. The non-FSR indigenous scientists can easily slip into a power struggle over the control of project transport and resources. Similarly, those in the Ministry HQ may also devote their efforts to the capture of FSR resources--an almost inevitable result when all the technical assistance "goodies" are concentrated upon only one segment of the research-ministry-extension linkage.
- An unwillingness to take the extension aspects of technology generation seriously. FSR projects typically leave the linkages to the extension services unresolved, or else state them in optimistic, normative terms at the "application/feasibility" testing phase. Few natural scientists understand that there must be feedback through the extension service in the initial design of technological options; or, even better, that extension staff should participate in the initial diagnostic analysis (thereby increasing its participative value).
- FSR scientists have substituted ill-considered diagnostic surveys when what they needed was diagnostic analysis. This is not universally true, fortunately, but it is a real danger. The "sondeo" when properly applied requires focussed questioning which systematically explores alternative hypotheses about what the real constraints are. It should be 25% questioning and 75% hard thought. What a field team easily slips into is, however, 85% open-ended data gathering on a grab bag of interdisciplinary topics, and 15% careful analysis. Hildebrand is entirely correct to warn that a survey is, indeed, the enemy of focussed analysis if it becomes an end unto itself.
- Diagnostic surveys are popular because FSR staff believe their inquiry should be multi-disciplinary, but they have never got beyond economics when it comes to developing an in-depth picture of the farmers' world. At present, then, FSR represents an integration of natural science with agricultural economics leaving social, administrative, and political factors as the residual concerns. Unfortunately, it is precisely in the social, administrative, and political spheres where some of the key constraints lie--constraints not identified in the kind of "fishing" questionnaires currently used to assuage the FSR researcher's anxieties.

- Had FSR staff done their groundwork properly, they would have long since discovered certain basic facts about the peasant farmers' "decision space". These are:
 - a) Calendar interfacing is critical. Many of the inputs needed to carry out technical recommendations are seasonally variable, e. g. on-farm labor availability and cash availability. If you find an FSR study which has not enquired about how water, labor, and cash fluctuate, its results should not be trusted.
 - b) Whether on-farm resources are under integrated management or not. Oft-times in Africa they are not.
 - c) The average levels of management one can expect vis-a-vis a certain enterprise, and the range of variability between top performers and modal performance. If recommendations are not scaled to average management, FSR has failed to produce a useful output insofar as the extension agents' task is concerned.
 - d) To what extent credit and timely application of inputs are assumed. For many communities, neither can be reliably anticipated, and thus a minimum cash/minimum purchased inputs package must be included within the final mix of options put out to clients.
 - e) That even within peasant farming, households vary greatly in their resource intensities and that such variations will override most technical considerations. Typically, most African communities have some families with extremely small land allocations, so what we need are horticultural options suited to, say, 1/3 of an acre. We need a different option for farmers who have access to ox-ploughing, and possibly a still different one to match predominant cash crops.
 - f) In Africa generally supra-community agencies are unreliable, and thus the degree of institutional risk associated with a recommendation will be a function of how many different agencies must participate. While FSR researchers have finally discovered rainfall risk, they apparently think institutional risk is an ephemeral factor not "real" in the same way as water availability is. To the contrary, this riskiness is very real indeed, and it varies in systematic ways as one shifts from zone to zone and community to community. Peasant farmers are quite willing to talk about it!
- It seems to be generally assumed that because we know the procedures for data analysis this task can be readily obtained in remote field stations. The truth is that many field stations suffer from an acute data processing bottleneck--an entirely unnecessary blockage. We need to think through data analysis from two standpoints:
 - a) How to involve field workers in doing it to examine parameters as they accumulate data, and thus spot bad data quickly (while also developing a genuine, intuitive understanding of phenomena);
 - b) How to tap the capacity of i) hand-held programmable calculators, cross-linked to ii) micro-computers for doing most analysis at the station.
- Finally, the task of simplifying and packaging recommendations is a highly skilled one, not generally well performed by research scientists. An FSR program must recognize this need and provide for it from the start if it intends to generate usable field materials.

If, then, the FSR projects currently in vogue are not going to make much difference in African agriculture, what can we say about how the technology transfer approach should be improved? Could the FSR umbrella be widened to link-up technology generation with technology diffusion? Since my recommendations up to this point are at variance with those of many natural scientists, let me be quite detailed in specifying where change is needed.

- We must recognize differences in access to on-farm water are a key reason why the Asian HYV experience will not transfer readily into much of Africa. Without abundant water, chemical fertilizers often do not perform well and in turn the plant breeder must work towards different objectives. Thus whether or not on-farm irrigation is feasible must be a major initial stratifying device, and probably 85-90% of African farming will fall into the rain-fed category.
- We must teach scientists how to use multiple criteria when screening research results. For example, work by De Vries and others in the Sahel showed that when total biomass per ha was measured, the indigenous livestock system outperformed the "improved" systems consistently. The "problem" was here that US trained research scientists in animal production measured performance as weight gain per animal per day--a criterion which in its total context gave misleading recommendations.
- Probably the highland areas of Africa do show expected relationships based on the classic HYV ideas of the 1960s (e.g. synthetic drought escaping maize, etc.). Here only minor adjustments are required, such as emphasizing intercropping and recording all labor inputs--something FSR staff are now generally doing. An additional need these days is to watch closely assumptions about inputs (availability, credit, etc.) and to measure foreign exchange implications of all recommendations. Natural scientists may need some help to understand that foreign exchange is critical, it can be measured, and it must be shadow-priced. Hence we should move towards minimum FE and minimum purchased input solutions.
- With the lowland zones showing a "layering" of constraints, we do require creative thought about how to identify the sequencing of interventions. If we start with husbandry first, which aspects? Can we use simulation models to test out sensitivities in advance, so that verificational research (experimental design) is employed more strategically on the key combinations? (Yes, and the sooner our scientists learn this the better!) Can we exchange data analysis programs across disciplinary fences? (ditto!!) What signals should be watched for in the environment to indicate that a new hitherto unwatched constraint is coming into play? There are a whole universe of design questions which need to be thought through carefully in regard to the especially complex environments of the lowland tropics. We simply cannot afford to start classic research designs to look at forty variables on sixty crops in fifteen zones.

- Some of the most interesting technological possibilities for Africa lie outside of conventional agronomy--which is perhaps why they haven't been adequately investigated. I am told that breakthroughs in tissue culture make the propagation of tree crops like jojoba (which in theory seems an ideal, long-term perennial for some of the lowland areas which currently depend upon livestock) much cheaper than previously. Israeli experts have done wonders with trickle irrigation. Botswana has its "water harvesting" structures for small-scale horticulture, and Zimbabwe its "Savory system" short duration grazing. The OPEC nations have sponsored UK research on water transport systems designed for high sediment loads (a perennial African problem). Foresters wax eloquent about the prospects of Lucinae as a quick-growing fuelwood. Indian scientists tell me the African amaranths are a valuable foodcrop and that their own dry-land legumes do excellently in some areas of Africa...
- It would be presumptuous in the extreme for an anthropologist to pontificate which of these options merit close study. What I do insist, however, is that our research efforts should widen their initial review of technologies to encompass the full spectrum of possibilities. Given what we know of the severe constraints which depress yield and/or profits on the conventional HYV packages, let us move cautiously in determining where to begin intensive investigation. Probably the National Science Foundation could be brought in to reassess the range of technological options which merit exploration.
- We can also say that the initial decade of support to African's international agricultural research institutes (IITA in Nigeria, ILCA in Ethiopia, and ILRAD in Nairobi) has not produced the breakthroughs which some had hoped for. There have been problems of finding and retaining top quality researchers, failures to reconceptualize research objective more appropriate to African needs, problems in dealing with the various African nations, etc. Nevertheless, the international institute remains attractive as an alternative to the excessive fragmentation which occurs when projects are put into all the national research networks. A critical and creative effort is needed to decide how best to use the international centers for African rural development.
- It is also unfortunate that the substantial scientific resource which were accumulated in Kenya and Zimbabwe--initially in order to support larger scale "settler" farming--have not been fully tapped to benefit the whole zone.
- Africa does have several quite strong management institutes (ESAMI, Managua, etc.), and there is an obvious case for using them more fully in screening and diffusing technological packages.
- Special efforts are required to bring the extension services into joint interaction with research programs, and not only as "implementers" either. The likelihood of screening out bad technological packages could be increased if extension services participated as equals in the design process. Also, the researchers have a virtual monopoly on the key input which extension staff need: up-to-date technical knowledge. Thus we should think of the technology generation-diffusion activities as an information exchange process with built-in feedback loops rather than (as at present) a discrete sequence of activities done by separate agencies.

4) The T & V System

The HVY model we have been discussing is directly related to what has become the single most widespread approach to improving LDC extension organizations: Daniel Benor's "training and visit" (or T & V) system. First developed and implemented by Benor for the World Bank in India, the T & V system is now being implemented under Bank urging in from 30-40 countries. Basically, it attempts to equip junior extension staff with changing extension messages on a two-weekly training schedule and then through tight supervision to insure they do actually work with specified contact farmers on a rotating schedule (Benor & Harrison, 1977). While the full model has a number of structural components, at the core it aims at upgrading the technical content of field extension activities while making the field agents' contacts more predictable and thus more accessible (to farmers) and more enforceable (to Ministry supervisors).

The first of these two objectives requires that direct links to agronomic research are cultivated, that farmers' fields are used for conducting feasibility trials, and that attention is directed to the three or four most important innovations before farmers are asked to assume the risks of using purchased inputs. All of these lessons stem from the experience of the Indian HVY programs, as well as from CIMMYT's earlier Puebla project. The second objective--making the extension worker's field tasks visible and predictable--requires a simplification of Ministry responsibilities (preferably by the creation of a unified extension service and the removal of its regulatory and information-gathering tasks), an insistence that field staff should not take on other jobs like arranging input supplies or assisting community development, provision of the transport and incentives so that field tasks can be performed as planned, establishment of realistic supervisory ratios, and assignment of a specified number of families to each field worker (the "contact farmers"). It is, in short, a coherent and interconnected system which in many respects represents a return within the extension services to classical principles of management. Its central innovation remains the all-day training sessions which Ministry staff are supposed to arrange for all field agents on a 10-14 day cycle (Benor & Harrison, 1977: 10-16, 29-39). Benor's own advocacy of his approach within the Bank has been a major factor in the T & V method's rapid spread outside of its original setting in India.

In contrast to the expansive funding available to support T & V, the literature evaluating the system is to date extremely slim. I know of only a handful of non-Bank sources. Outsiders' accounts like those of Syed Ali or Howell for GDI while useful remain at the level of very general preliminary analysis. Howell (1962:6-9) tells us the system was refined in the Rajasthan and West Bengal areas of India, has since been spread to many other sections (Orissa, Assam, Maharashtra, Karnatka, Bihar, Madhya Pradesh, Haryana, Gujarat) and now is being tried in Nigeria (Ayangba and Lafia), Malaysia (the Muda scheme, like many of the Indian cases linked to a Bank-assisted irrigation project), the Upper Region of Ghana, and Botswana.

As it happens, the Indian extension programs are well described in published sources giving us a fairly firm picture of the context in which T & V was refined (some of its initial elements were also developed in Turkey). What are, then, the distinctive features of the Indian scene which appear to have influenced the design of the T & V system?

- India has a long tradition of village level extension work. The T & V system is only the latest of many measures taken to try to realize more effective output from what were originally called the 'Village Level Workers' (VLWs or contact extension staff). A hierarchy of village agents reporting to a higher level (the 'Block Development Officers, or BDOs) and under the general guidance of elected councils (the Village Panchayat system) had already been in place for two decades. The T & V system thus attempts to redefine and narrow the role of village extension staff away from generalized rural development and towards agricultural production (for details see Hunter 1970, Hunter & Bottrall 1974).
- Since the HYV and IADP program days (mid-1960s), India has put substantial resources into strengthening agricultural research stations and establishing a parallel network of agricultural (or "land grant type") universities. During the HYV campaigns for wheat and rice, University staff became accustomed to working directly with farmers in surrounding client communities. This usually meant approaching farmers in the company of their village extension agent, a type of contact for which the T & V system provides an organizational base. However, by the same token, those countries which lack powerful institutions of this kind will have to find other sources for the input which the T & V system requires.
- The existence of superior technology is taken for granted by T & V. This was not a major problem in India because the country's training and research institutions were by the early 1970s quite successful in generating a stream of relevant innovations (Mellor 1976, Streeter 1970). With increases of up to 500%, the new HYVs were eagerly sought by Indian farmers. As production snowballed, the Indian government was forced in turn to develop commercial fertilizer and seed companies which could supply inputs throughout the country. Here India's existing industrial base built up in the 1950s and 1960s also proved advantageous. And, most importantly, the Indian Government encouraged farming by letting grain prices rise.

- A further advantage but also a complicating factor was that the T & V system was being implemented (at World Bank insistence) as an adjunct to major irrigation projects. The irrigation command areas had their own internal administration which cross-cut the normal territorial units. On the one hand, this has meant that HYV adoption and double or even triple cropping were feasible. On the other, it generated many structural problems arising from the three-way struggle between irrigation authorities, Ministry of Agriculture staff, and the existing block development system. According to Syed Ali (who implemented the T & V system in Andhra Pradesh), the system contained no provision for these inevitable structural complications. The attempt to implement its single function/single line of command provisions even led to disaffected staff members taking their case all the way to India's Supreme Court (Syed Hashin Ali 1981:4).
- In comparison to African states, the Indian civil service has a relatively strong record. The quality of its performance is probably higher than outsiders unfamiliar with India's internal problems recognize. This might suggest that the T & V system--which is in essence one type of internal administrative reform--benefitted from the general competence and neutrality of the senior Indian civil servants. On the negative side, we might also note that the 'top-down' nature of the T & V system is highly congruent with the rather authoritarian bias of the Indian civil service.

In sum total, these observations suggest that the T & V system does depend rather heavily upon the support of an accompanying HYV approach, and that even in India there may be additional structural problems which the system's advocates choose to ignore.

What predictions can we hazard about the effectiveness of the T & V system as the solution to weaknesses in African extension services? Here we are limited by the very thin documentation on the T & V system outside of India. Based on my own East African experience, it would seem to me that there are both positive and negative aspects to consider. These are:

(a) Strengths

- The T & V system has a public sector, 'top-down' emphasis which matches closely the types of bureaucratic attitudes and structures one finds throughout Africa. In this regard, it probably stands better chances of success than many US derived managerial innovations. But it will also perpetuate this kind of organization.
- Any program which upgrades awareness of the central importance of effective extension within the Ministry of Agriculture's many roles is to be welcomed. The stress upon having a single extension division is sensible, and would make possible the kind of carefully thought out and coherent agency-wide planning which T & V assumes.
- The goal of insisting that senior researchers deal regularly with subject matter specialists in the Ministry and with actual field staff in selecting innovations is all to the good. The necessary institutions are already in place within many African countries, and the implementation of T & V can insure regular communication between them occurs.

- The stress upon having realistic supervisory spans and adequate resources for the field staff is greatly needed. Often these aspects of internal agency functioning have gotten out of control because of financial stringencies. The T & V system's insistence that the field agent has a known client load and that farm visits are done regularly is, in my view, long overdue. This may mean that fewer farmers are dealt with but at the least work can be carried out as planned and other devices be found (such as rotation) to spread impact more widely.
- Similarly, the idea that research results must be feasibility tested on the farmers' land is eminently sound. Benor is also to be praised for having the courage to insist that farmers must grasp the critical managerial innovations thoroughly before incurring any credit burden.
- Finally, if the system operates as planned the regular updating of the field agents' technical knowledge can only benefit the farmers. These were, in fact, the basic principles of extension work in the USA and there is no reason to believe they do not also apply in Africa.

(b) Weaknesses

- Proven technological innovations yielding a 50% or more increase are simply not yet widespread in Africa, particularly in regard to the more marginal environments. Here the T & V system's assumption that there is already an effective technology-generating network in place strongly limits its applicability. Without the on-farm advantages of easily perceived benefits, the extension service will have difficulty selecting innovations to emphasize. In turn, its own contact agents will soon tire of promoting unpopular and ill-chosen recommendations.
- The T & V approach is very organization-intensive at middle management levels (again perhaps reflecting Indian civil service strengths). Somebody must put in a large additional effort over present practice in the screening of innovations, designing training aids, setting up field schedules, recruiting subject matter specialists and field supervisors, arranging for finance to cover transport and supervisory overheads, etc. Such tasks require a level of commitment and a cost consciousness which is simply not found at the middle levels of the typical African Ministry of Agriculture. (If you examine present programs, many of their weaknesses also originate at the middle-management level.) While by special arrangement with FAO or other donors these planning and coordinating functions may be supplied for a while, over the longer haul it is likely the middle echelons cannot provide the outputs needed on a continuing basis by the T & V system's field training seminars.
- Specifically, a properly run T & V system once underway would have a large appetite for processed technical information, plus extra inputs of "training for the trainers". While in theory many countries might claim to have the needed support institutions for packaging raw research results, few do in actual fact. This explains why development practitioners are already leaning towards the conclusion that T & V works best for the simpler innovations--anything more elaborate would exceed the kinds of specialized training support which most African countries can provide.

- By insisting its field agents only deal with crop improvement, the T & V system does presume that other agencies are present in the community to handle crop finance, farm credit, land reform, disease diagnosis, etc. In fact, in many poor African countries the extension service is more widely spread than most other commercial or farm services. In the more marginal areas, if the extension agent doesn't organize things like fertilizer storage or insecticide supplies, nobody will. This has already proven a major bone of contention within the various African countries implementing T & V (Howell 1982:11-12).
- A central premise of T & V is that field agents (as well as their supervisors) can set and adhere to schedules. This idea is so central we might even view T & V in essence as a form of time management rather than extension per se. To be on time, agents must have adequate transport and must be free from overlapping claims by politicians and others. We saw earlier that in African administrative systems, delays accumulate downwards; many field staff are located far from farmers but without transport. The Ministry's own supervisors will find themselves subject to many delays and unscheduled demands; it can be predicted in the countries I know anything about that they will often break their commitments. Once it is seen that the supervisors themselves are delinquent about meeting schedules, what will happen over time to the reliability of junior staff efforts?
- The T & V system's changing calendar of main husbandry emphases suits areas (like the wet-rice and irrigated wheat zones of India) which rely on a single predominant crop. It also assumes that the 'average farmer' used for planning purposes does represent a large category of farmers (Howell 1982:10). This rigid and rather simplistic concept of farmers' needs is inadequate if localities contain pronounced ecological variation, if there are divergent farming types, if farmers incorporate different types of livestock or machinery, or if they live in marginal lands cultivating a spectrum of annual crops. If farmers have significant needs for on-farm diagnosis (disease outbreaks, determination of soil types, etc.) or if there are major problems at the community level (shortage of storage, corrupt leaders, etc.) they cannot look to the T & V system for help. Since all these traits apply to much of Africa outside of the favored high-land areas, some relaxation of T & V procedures would seem imperative.
- Finally, the T & V system insists that extension agents stay out of the marketing mess. Again, this is feasible where private traders are well organized and where food crop prices are rising. In Africa, the export crop prices have been stagnant or declining; the immigrant traders who served as middlemen have sometimes been squeezed out; and in general governments lack the will to pass on rising costs to politically mobilized urban consumers. Under such conditions, marketing aspects and costs take on a life-or-death importance which the extension service simply cannot ignore (an observation most true for the most peripheral communities).

There are other criticisms which Howell lists as having been made against the T & V approach, but they concern aspects such as administrative costs or the nature of farmers' groups which impinge upon any extension system. Still, it seems the above reservations have sufficient weight to indicate that T & V proponents should not count upon realizing easy success in the African context.

5) Is Management the Missing Ingredient?

A fundamental flaw in 'second generation' development policies was, I suggest, the failure to recognize the central importance in such programs of efficient but flexible administration. In the absence of reasonably efficient administration, many otherwise attractive rural development measures become counterproductive. Credit, for example, gets captured by existing elites who already enjoy access to private credit but who prefer to receive it at subsidized government rates. Fertilizers yield no advantage if the wrong types are chosen or if they arrive too late for application. Similarly, flexibility is essential because these programs required a common focus involving many different organizational units which customarily did not cooperate with each other, and for success the EYV package needs to be adjusted to the particular ecological and commercial circumstances of each community. What one sees in country after country is that the various agencies which should be involved do not cooperate, and even when they do, their internal administration is not tight enough to deliver on the commitments that each agency enters into. Alternatively, some senior minister gets everyone involved, but then dictates a standardized package which is incorrect for many of the localities where it is implemented. The "correct" policies get adopted, but the implementation is so rigid, contradictory, uncoordinated, hesistant, and incomplete that the whole approach soon becomes discredited. From examples such as these, development practitioners working in Africa have broadly concluded that poor or weak management is the major reason for the continent's disappointing performance in agricultural development.

This conclusion is both valid and misleading. It is valid for all the reasons reviewed above, which underscore the absolutely crucial importance of strong managerial capability as a necessary component in any publically sponsored rural development program. By recommending policies without regard for implementation capability, economic advisors were in a number of cases exacerbating existing weaknesses and in the longer run making countries less rather than more capable of managing rural development. That much is clear from the African record, and has already been incorporated into the newer generation of economic texts (see

It is misleading, however, in the implications it suggests to policy-makers both internal and external to a given country. In the immediate context of a strongly hierarchical administrative system--such as one finds almost universally in African public ministries and parastatals--senior officials are likely to respond to the need for "tighter" administration by increasing reliance upon formal authority, as Leonard points out for the Kenyan extension services (1977:82):

In Kenya, belief in the efficacy of the formal sanctions aspect of authority is widespread and deep-seated. Employees are thought to respond only to punishments and wage incentives. The elite conception of the good supervisor is a remote, demanding, and authoritarian figure.

To the contrary, Leonard's own research at the farm and community levels showed that the more authoritarian agricultural officers in his sample produced lower worker productivity on the part of the junior extension agents' efforts (1977:90-92). More generally, when African ministries and parastatals try to become "efficient" they turn to the very measures which we can predict from well-tested organizational theory decrease motivation and depress performance over the longer run.

Outsiders as well as insiders often make the second mistake of thinking of managerial capability as a coherent property of a system, an "output" which in turn depends upon the "input" of the numbers of "high" or "middle" level managers available. If these numbers are insufficient (as both economists and nearly any African political leader will insist they are) then by pumping in external training and by expanding local training opportunities one can over time augment a country's "high level manpower" situation. Again, Leonard's empirical research showed in detail what several other researchers have found in other African countries, that better educated young men who are being appointed to extension positions show lower motivation and worse on-the-job performance (1977:101-128). In specific detail his findings undergird and support the general conclusion we have argued in this paper that "good management" is an emergent property of the total operation of an administrative system rather than being an "output" easily influenced by changing systemic inputs. In turn, this suggests to get improved productivity may require effecting numerous changes throughout the system--the topic of our next section.

In LDCs, the absence of "good management" occurs because when individual managers act rationally in response to their immediate contexts, the outcomes do not support "good management" for the organization as a whole. This situation can be contrasted with the organizational decision-making which occurs in a private LDC firm where the environment is predictable and employees share interests similar to those of their clients. In such contexts (which are taken for granted within much of the "western management" tradition) rational action by individual managers does usually also appear rational from the standpoint of realizing organizational objectives. Thus major changes in the systemic are rarely required. If instances of "poor management" come to light, it is generally sufficient to reprimand the manager or, in more extreme cases, to replace the management team. In LDCs, to the contrary, because the actions which reinforce bad management seem rational and necessary at the proximate level of the individual decision-maker, to encourage "good management" one must effect major changes in the functioning of the entire system. This is obviously a much harder task which exceeds both the determination and the vision of most policy makers.

We have emphasized the possibility that it seems African agency performance may be worsening over time, despite the injection of outside aid and numerous technical assistance projects. This deterioration can be explained in several ways. It may be an outgrowth of the entrenchment of particular groups in power, so that as organizations become fully staffed the national government loses the leverage to make further changes easily. It may be related to the internal rigidification which occurs when an agency that once had 200 employees grows to several thousand. Yet again it can be that the 'hub-and-wheel' pattern for task delegation breaks down when tasks become more complex than a single individual at the top can coordinate. Or it may be that by pumping well educated but inexperienced staff into the lower levels the top management is unwittingly accentuating internal alienation. There is no definitive source which documents empirically which of these reasons are the most significant source of performance slippage. What we can say, however, is that reversing the momentum which the African administrative systems are acquiring will take determined effort on many fronts, possibly a larger commitment than Africa's current leaders will consider.

Table 5. Suggested Interventions

A.- 'Process' Improvements

1. Stop taking actions which only make the situation worse.
2. Identify the key performance sectors that need close watching.
3. Rectify for missing signals in the economic and administrative system.
4. Modulate incentives to get desired organizational behavior.
5. Make planned use of improved budgetary procedures.
6. Let the market determine prices and input supplies.
7. Devise methods of transfer pricing for internal operations.
8. Give special attention to the low productivity institutions.
9. Make routine administration less energy-intensive.
10. Get people excited about what can be done.

B. Extension Reform Measures

1. Introduce an agricultural policy focus into Ministry decision-making.
2. Review staff incentives to reward field performance.
3. Strengthen in-country adaptive research to generate new technologies.
4. Redirect M.S. training towards case analyses of field problems.
5. Prepare organized support for introducing the T & V system.
6. Cluster district extension functions into three domains.
7. Structure organized feedback from the district to the national level.
8. Develop a middle-management package for agricultural staff.
9. Reform the budgetary process to emphasize completion of current projects.
10. Initiate extension staff retraining as a continuous learning function.
11. Organize networks of contact farmers.
12. Make field agents more downwardly accountable.

C. Donor Assistance

1. International consolidation of program experience.
2. Technology screening by donors.
3. Drought aid leverage.
4. Sustained emphasis upon project completion.
5. Facilitate between country exchanges of technical materials.
6. Create US based extension expertise.
7. Improve participant training in the USA.
8. Identify a recipient 'land-grant' type institution in each country.
9. Make better use of the international agricultural institutes.
10. Media/software assistance in technical fields.

III. INTERVENTIONS TO REGAIN PRODUCTIVITY

How might African governments get their agricultural development agencies back under planned control and into effective operation? Let us deal with this bundle of policy issues in four stages: i) general "process interventions", ii) the essential requisites, iii) specific changes within the extension services, and, iv) donor inputs. (See Table 5 overleaf.)

1. Generalized 'Process Interventions'

1) Logically the very first step to take is to stop making the situation worse. At various points throughout this paper I have tried to highlight actions which often may appear "necessary" in the short run but which have the predictable aggregate effect of worsening administrative malfunctioning. Unfortunately, a number of these consist of political interventions which decision-makers have adopted in hopes of accelerating rural development. Some of the actions to avoid are:

- Anything which stimulates scarcities while putting officials into positions of great temptation, since this is bound to feed corruption.
- Actions designed to remove public agencies from competition, thereby rewarding them for inefficiency.
- Crash programs adopted without adequate preparation.
- Major new projects of an excessively "lumpy" nature, which will sop up foreign exchange, skilled manpower, and the time of national decision-makers.
- Opportunistic, political staffing of technical functions.
- Encouraging proximate decision-makers to set overambitious or unrealistic output targets. The incorporation of such targets sabotages the whole planning process.
- Measures which unnecessarily increase job security within cadres where such security is not strictly necessary.
- Overinvestment in new training programs at expense of adequate support for existing ones.
- Failure to build recurrent cost estimates into the budgetary process.
- Large incremental expansions in "successful" programs (or the unfunded and unnecessary increase in functions assigned to these programs)
- Adding new responsibilities to public sector agencies beyond what is strictly required.

Since several of these come among African leaders' favorite tactics, we must anticipate a tough battle.

2) A second need is to identify key performance sectors where any shortfall in output is bound to influence many other decisions. The two we have already highlighted include: i) watching the main foreign exchange earnings and commitments closely, and, ii) remaining alert to the possibility of impending famine. The economic dimensions of (i) are well known, but tend to be considered in formulating five year plans rather than on a day-to-day basis. There are also non-economic aspects to consider: the threat of a new disease in a particular crop, for example, or perhaps the perfection of synthetic substitutes. In regards to (ii), FAO/UNDP have tried out the establishment of "early warning" systems for crop monitoring. However accomplished, the aim is here to create organizational attention at a high level, so that the system as a whole becomes sensitive to critical factors affecting national well being.

3) A third line of attack should be to rectify for missing signals in domains where bureaucratic inattention may have serious consequences. A principal advantage of open competition is, of course, that where it exists the market will supply loud signals when output departs from what demand warrants. If we take the "signals" function out of the marketplace, then equivalent mechanisms must be created which can warn when circumstances dictate new policies. The literature is full of examples to show that this is where public bureaucracies often fail: persistence in loss-making projects, sluggish response in times of crisis, failure to anticipate opportunities, etc. (Peirce 1981). It is easy to see that there is a problem here--and one not confined to LDCs, either!--but not so simple to rectify it.

First, we must judge whether the difficulty is indeed missing signals or if instead the organization shows a failure to react to received intelligence, i.e. missed signals. In the latter case, what is needed is more reactive public sector management (organizational intelligence). In the former case, we must then find ways either to establish routine information flows that monitor the environment or else "flag" those flows which exist but which the organization has been ignoring. It is embarrassing to African countries that at the moment the donors have been perceiving problems earlier than they have been recognized in the country where they originate. Somehow national leaders must receive warnings from their own systems earlier than they do at present, and ones which cover a wider range of critical dimensions (e.g. trends like the growth in the nonformal economy).

4) A fourth area for intervention is the need to modulate incentives to encourage behaviors which strengthen systemic capabilities. It seems obvious that the worsening trend of present performance indicates that incentives do not reward the desired behaviors. To learn what might be done will require looking closely at perceived incentives and sanctions within the system as presently constituted. We should try to avoid a priori assumptions. This will probably require actual behavioral investigation and a large amount of careful redesign by those who have extensive experience within the system. At a minimum, the whole package of benefits--postings, promotions, allowances, housing, amenities, transfers, and training nominations--should be reassessed to find points where leverage in a desirable direction can be increased. A central question is the kinds of evidence used when deciding to promote someone --could this be where downward accountability is introduced? Again, nominations for overseas training are greatly desired. Could these be used to stimulate the completion of projects and inter-disciplinary cooperation? What about rural and hardship post allowances? Or having a pool of short-term "substitute" staff (perhaps new trainees during their first three years of work?) so that when one person is moved the agency doesn't need to shift others to fill the position? Since this is an exceptionally sensitive area where little imaginative work has been done, it might be appropriate to start with a cross-national survey done by outside consultants (perhaps by an international agency like the ILO or OECD).

5) A fifth change is to make planned use of improved budgetary procedures. After staffing issues--how individuals are selected and promoted--the most significant single point of leverage on an administrative system is its annual budgetary appropriation. The procedures in use to guide how budgets are prepared and then disbursed acquire tremendous influence within organizational functioning (the whole reason why zero-based budgeting has such an appeal to politicians trying to reassert their control over technical functions). Given this fact, and the recognition that several implementation weaknesses trace back to faults in the budgeting process, this remains an obvious area for further experimentation. But beware of the fiscal experts who usually are called in to perform this task! LDC systems work differently from the ideal ones we teach about in organization theory, and we must make due allowance for likely responses to any system we propose (here see especially the excellent volume by Caiden and

6) The sixth necessary change is to let the market free to do what it handles best. I am not advocating that cost recovering private firms are an ideal answer to every service need. But the small, multi-product family business we used to see in Africa is inherently less expensive and more flexible in running many kinds of dispersed rural enterprises: contracting, the retail trade, bus services, building rentals, equipment repair, tractor ploughing, paint supply, fertilizer sales, food marketing, and various other low-level commercial services. African governments have an ingrained tendency to impose restrictions where they are not needed. Often they have moved to protect the inefficiency of large public agencies by driving private competitors out, perhaps by means of licensing restrictions. It is high time socialist leaders like Nyerere or Mugabe come to their senses and recognize that competition by a vigorous, small-scale private sector is a vital safeguard to protect peasants from public agencies which become too exploitative and over-bureaucratized. Of course, once the economy gets completely out of control more drastic measures may be required. Then a lifting of price and currency controls may be the only effective way to bring economic exchange back into formal channels, as Uganda's decontrol policies seem to have done (in marked contrast to Tanzania's failure). Here the danger--which we discussed earlier--is that once a nonformal economy becomes integrated throughout an entire region comprised of several countries, it may be that even the classic remedies will no longer be effective. At any rate, in regard to food production there is no alternative but to let food prices rise to reflect actual increases in peasants' production costs. Unless African governments stop subsidizing their urban consumers, they will never break the cycle of subsistence farming and inadequate rural revenues to cover the costs of their public sector extension services.¹

7) Since large public agencies will remain, we must also devise better methods of transfer price accounting to make their internal operations more cost recovering. A large share of parastatal inefficiency arises because parastatals do not generally have adequate methods for affixing transfer prices within their internal operations. All sorts of benefits get absorbed into a ballooning overhead cost function, which reflects the externalized costs of football teams, cafeterias, staff clinics, bus services, etc. The only answer is to impose tough transfer cost accounting methods which force users to pay for services at source, even if the users are part of the same overall agency. Otherwise parastatal overhead cost margins can never be held under control.

¹World-wide experience with "privatization" policies would make a timely topic for an international conference.

8) Our eighth area for intervention should consist of a frontal attack upon low productivity institutions. In any national system, there are some parastatals which for various political, strategic, or structural reasons simply must continue no matter how unproductive their record. Typical examples include the national railway system, the telephone system, public power utilities, universities, agricultural research stations, irrigation authorities, and even management training institutes. A handful of these will soak up a major share of public expenditure, perhaps far beyond their present contribution. While the costs may be unavoidable, the low return is not. The imbalance identifies which institutions deserve priority attention; it also provides an acceptable public rationale for taking fairly drastic actions.

Perhaps the country's larger management training institutions should be the place to begin. If these can be made effective, they will furnish resources for tackling the rest. In-depth investigative teams should be assembled to analyze current productivity at each of the major "problem" institutions. Students on mid-career training might then supply analyses from diverse analytic perspectives. The institutional management must be involved throughout, and must develop a commitment to implement whatever solutions the team advises. As a group, the team should document empirically what actual constraints have been limiting performance. The larger case studies might become Masters theses, which in turn supply additional data for subsequent training and analysis.

A collaborative effort of this kind need not require vast amounts of money. Managers already hold their jobs, and produce reports. Mid-career training courses of 6-12 month duration are already being given in most institutes of management. The change would be to make this a multi-disciplinary team effort with real world consequences. If it can be made clear to the managers at the start that there will be both winners and losers at the end of the exercise, it is more likely to be taken seriously. If outside consultants are involved--a desirable feature, given the size of investments typically at stake--they should serve more as resource personnel than as the framers of recommendations. If it can be done successfully in a few key instances, a retooling effort of this nature might over time widen its attention to the whole agricultural sector.

9) Our ninth "process intervention" aims at reducing the energy input required to make the administrative system work. In reality this is a category of reform measures rather than a single item, and it is not yet clear just how it can be accomplished. What one can say from field experience is that African management requires an inordinate amount of the executive's personal effort and time. This in turn pre-empts higher level managers from solving more basic organizational problems, because they are so busy trying to keep routine activities moving. Making junior staff clearly responsible would help; secretaries should be given the power to commit their superiors' schedules; better organized vehicle servicing might insure that transport is available when needed; radiocall networks could take the place of unreliable postal services; and ID photographs for accountants might make it unnecessary for the manager to sign all checks personally. These seem individually to be small improvements, but since the energy drain is a cumulative function there is no shortcut for searching out each little improvement which makes routine actions easier and more reliable. And, finally, most LDCs could benefit immensely from a simplification of forms and procedures required in gaining government assistance (as could we all!).

10) The tenth intervention is the most general: creating a sense of excitement which comes within an organization once people begin to believe the problems can be solved and their actions are making a significant contribution to general welfare. Peters (1978) argues persuasively that trying to implement too many reforms piecemeal can give worse results than doing nothing at all. Successful executives use attention-directing tactics, which focus organizational hopes on one or two critical changes. Provided people in the organization believe the changes will be effective, they often are. We have to develop an organizational ideology equivalent to the plant breeder's faith that he knows how to get better varieties. Benor has such a faith in his T & V system, and by everyone's account this has been a major factor in its "success". The measures we have itemized do not specify how they should be packaged for use within the organization. Those who might face this task for a given country should prepare themselves by rereading Peters carefully, and then choose a few predominant themes which can be presented as a common program worth doing. Our analysis here does not take that final, crucial step which makes the whole into a viable reform package.

2. Essentials for Effective Program Organization¹

From a review of many rural development programs, I would like to propose certain structural requisites which are the essential properties behind program success. There are fifteen of these:

- Sensitively chosen organizational objectives. To be effective, these need to be communicated throughout the extension service.
- A shared belief that individuals should act, that their actions will be effective, and that farmers will benefit--in short, a sense of organizational excitement (see Peters 1978).
- Inclusion of at least one "high pay-off" technology to be the incentive for farmers' participation.
- Ability to attract and hold key staff within field assignments.
- Devices to increase the visibility of good performance, so that it enhances the individual's career advancement.
- Assignment of direct responsibility for all key activities.
- A mechanism to identify and obtain adequate coordination of the inter-organizational matrix (those agencies whose support is vital).
- Open channels of communication, both horizontally to other agencies and also vertically within the extension service and beyond it to sources of expertise and new technology.
- A tradition of teamwork and shared responsibility unifying contact staff with the central administrators.
- Realistic job assignments, including provision of the necessary transport and task resources.
- A style of supervision which emphasizes creative individual responses to fulfill the organization's service objectives.
- Direct access to technical expertise and to technology generating systems.
- Freedom from day-to-day political interventions and direct control over program resources.
- Downwards accountability, so that "success" is measured in terms of problems solved and the meeting of farmers' and communities' needs.
- Creation at all levels of a general environment for decision-making wherein what individuals will tend to do is also in the organization's interests.

It should be clear that this listing identifies functions rather than structures. By "structural requisites" it is implied that there will often be more than one way for providing a given functional capacity. For example, access to a dynamic technology-generating system can be realized in several

¹For a fuller discussion, see my "practical implications of experience" (pp. 116-125) and "a systems approach to production services" (pp. 61-62) in Managing Induced Rural Development (1981). Other useful texts include Paul (1983) and Bryant & White (1982).

ways. Technology can be "bought in" by contract with private firms; it can be imported when senior staff return from international research centers where they may have learned new skills; it can be supplied from a linked 'land grant' type of university; or it may result from the Ministry's own agricultural research network. It is time to recognize that no single structure is necessarily productive in all settings. Rather than lengthy debates about the ideal structure for the research-extension-training linkage, what we need are analyzes of areas of operational breakdown within present institutional complexes. The goal should be to find ways to encourage the desired capabilities with minimum further expenditure. Of course, there will sometimes be the situation (perhaps in a country without previous investments in institutions of this kind) where a fresh start is recommended--and then it is helpful to have an ideal structural model. But much the more common situation these days will be that the analyst must deal with existing institutions and must pinpoint initiatives that promise to be locally feasible, effective, and acceptable.

Most users of this report would have little difficulty in generating precise specifications to match these requisites if designing a new system from scratch. The task becomes much more complicated when we must adapt our ideas to the severe financial and political constraints of an already operational system--here Radian's chapter "How to Do a Lot with Very Little" should be required reading (1980:85-110). What I suggest is to use these points as a diagnostic checklist, identifying where the weakest links in a system are found. Once located, the problematic functions can then receive priority effort.

This is why a review of the range of likely options (to be presented below) is merely the first step. Such suggestions constitute a total package which far exceeds what local systems will tolerate in the way of organizational innovation (let alone what donors are willing to fund). Consequently in any given national system--for Sudan or Somalia, let us say--a large measure of astute diagnosis and adaptive redesign will be needed. The extension analyst must discover which structures are involved, where the bottlenecks limiting present productivity are found, and which aspects of current practice are susceptible to external leverage. This is, indeed, an extraordinarily difficult task to carry out successfully--one has only to list the hundreds of failed administrative reforms to see how slim are the chances for realizing quick success.

3. Necessary Extension Reforms

We come now to the core recommendations of this report: the total package of administrative reforms which are aimed at getting a malfunctioning public-sector extension service back into more effective operation. Let us start from the top, though recognizing that sometimes the bottom-level innovations involving contact staff may be the most important of all.

1) Introduce a Policy Focus. Agricultural programs are strongly affected by the kind of bureaucratic inattention often encountered within the diffuse and unstructured programs of the typical Ministry of Agriculture. Some way must be found to insert a small nucleus of from 3-5 key staff members near the top, who will keep the critical elements of agricultural policy under review and insure that the Ministry's program reflects clear and agreed priorities. The three essential concerns to keep under constant review are: i) the food situation, ii) performance of export crops, and, iii) input availability and foreign exchange implications. Probably these should be full-time positions filled from among a nation's most experienced professionals. The food situation position would obviously overlap with price policy, location and nature of technical assistance projects, long-term geographical strategy, and a sub-unit doing "early warning" of drought or other calamities (such as disease outbreaks). The export crops position should be a person intimately acquainted with all the major crop parastatals, with marketing organization, and with the country's foreign exchange needs. The inputs position should be somebody on the central bank's exchange control board (to insist upon necessary waivers for spare parts and other critical imports) with lines of communication into the private sector and the co-operative movement. Together they should be expected to raise policy issues in any forum necessary in order to maintain the direction and momentum of the country's agricultural development effort.

How and where such a unit is located will depend on particular situations: ideally, perhaps, at the top of the Ministry of Agriculture's Planning Division; or, alternatively, as the executive to the Cabinet's economic committee or maybe as the agricultural sector team in the Treasury or Ministry of Planning. In recruiting for these positions, care must be taken to avoid staffing them with bright, young technocrats who lack authority and experience. At the same time, those chosen should be located under a powerful Minister in such a way that

they complement rather than rival his (or her) political authority. If placed in separate ministries, the members will require strong backing to insure they interact freely and easily. In fact, it may well be that the required positions already exist but the individuals who fill them never meet to review the total situation jointly.

Identifying the people is just the enabling step. It leaves unstated the major question what it is that we expect them to do. As I see it, an agricultural policy unit should:

- Remain alert to signals which indicate changes should be considered. Given the market imperfections within most LDCs, this may be such a unit's single, most important function. What signals to watch are not as yet specified in the literature, and merit further scrutiny.
- Articulate the major objectives and crop development priorities for the entire agricultural sector (possibly as part of an annual plan review). These should include sub-objectives specifically addressed to the research network, carefully chosen with an eye towards the long lead time often required in developing agricultural technologies.
- Scrutinize the entire national effort to isolate bottlenecks and identify limiting factors. Once these are pinpointed, the policy unit should be free to negotiate directly with participating universities for special studies to confirm hypotheses. It should also be a part of any general reviews of technical assistance, so that new projects go where they are most needed.
- Select, supervise, and integrate the activities of supporting scientists called in to work on pressing national problems. (Here there may be a prospect to get more focussed assistance from prestigious national bodies such as the Scientific or Agricultural Councils.)
- Have power to assemble whatever advisory panels, seminars, national commissions, or other special forums are needed to maintain communication between all parts of the agricultural sector. Similarly, it should be established as a right that any lower level official or body can appeal outside normal channels to the policy staff on any matters of critical agricultural importance.

Our overall goal is here to institutionalize reactive intelligence near the top of the agencies presently in charge of rural development. Otherwise the detailed preparation of subsidiary measures is bound to fail. There are many steps within these agencies' present powers which are not being taken. This fact by itself indicates that within many LDCs the power at the top gets over-centralized in the hands of one or two officials who do not have the time to monitor field trends or to think through the detailed planning of new initiatives. The creation of this capability at the top must take priority over all other measures, since without it implementation is foredoomed.

2) Review of Incentives. Earlier the case was made for "incentive modulation" as a different kind of manpower analysis, one aimed not at increasing the stocks of manpower but instead at getting better output from existing staff. Such an exercise is particularly needed within ministries of agriculture and their related agencies. Agricultural sector staff are prone to feel themselves hard-pressed by circumstances: the remoteness of field assignments, the lack of recognition for problems solved, career stagnation if one does well in training and research,¹ the high level of technical expertise demanded of individual officers, etc. Also, we said that teamwork across formal lines is necessary but actively discouraged by present agency heads. On the negative side, we have argued that using accountants to trace cash misappropriations is to misapply a scarce resource. Given the long lag between transactions and full audit, and the many ways of 'losing' vital records, any reasonably energetic African official has little to fear from auditors. Thus positive pressure to submit rough trial-balance accounts promptly would be far more valuable than the negative sanction of potential civil action when lapses are discovered years after the fact (and the official concerned long since transferred). All in all, agricultural ministry staff at the moment waste considerable effort going through the motions of applying regulations which everybody admits are ineffective while themselves responding to cues in ways counterproductive to organizational success.

It would be very useful, therefore, to have at hand a carefully conducted review of perceived benefits and sanctions as they now affect extension staff. Preferably this study should include data gathered at several levels and incorporate staff of several agencies (e.g. cash crop authorities) as well as the Ministry of Agriculture itself.

Desirable changes to aim for might include: i) encouraging staff to take direct action to resolve problems; ii) rewards for 'hands-on' fieldwork and for sticking with assignments through to completion; iii) 'hardship allowances' to compensate for particularly isolated postings; iv) loan financing to assist in obtaining the tools-of-trade; v) drawing upon client opinion in deciding upon promotions; vi) giving rewards for the product when actually achieved; vii) finding effective methods for discipline other than transfers; and, viii) in general encouraging open communication and rapid feedback.

¹In many African countries, the staff assigned to mainline executive positions are more visible and achieve more rapid promotion than those working in specialized services like research or training.

3) Strengthen In-country Adaptive Research. With someone at the policy level setting objectives and monitoring progress, it becomes feasible to re-direct agricultural research towards definite goals related to actual national needs (rather than the customary disciplinary interests). Deciding what needs to be done in relation to technology generation depends upon the answers given to five questions: i) Is there a backlog of promising technologies to extend-- i.e. is this even a priority area for concern? ii) Should assistance be concentrated on the Ministry-linked research network, on the training institute networks, or on both together? iii) Which crops/enterprizes deserve the most urgent attention? iv) Is there an adequate support system in place to do the feasibility testing, materials preparation, seed bulking, and input supply? v) How can we get more effective assistance from the international agricultural institutes (IITA, ILCA, ILRAD, ICRISAT, etc.)?

I should warn here that technology generation systems are internally complex. It would be a major error to assume that merely by inserting one component, say a "farming systems research" (FSR) project, immediate improvements in output can be expected. The whole range of bottlenecks which were earlier described for African national systems also occur within the technology-generating institutions, and must be addressed by appropriate reforms. I also repeat the earlier observation that in Africa we face multiple and overlaid technological constraints, so that an unusual degree of persistence is required. A final warning concerns the built-in tendency of disciplinary-oriented research to perpetuate itself, so that unless great care is taken research investments may simply increase the establishment and not the useful output of participating institutions (here note Swanson's criticism of US training assistance to the technology development sector, 1975:37-38).

There is a large literature on international agricultural research, with the works by Scobie (1979), Arnon (1981), Ruttan (1982), and Wortman & Cummings (1978) being the key references. It is, however, strongly biased towards the economist's preoccupation with investment priorities rather than the administrator's concern with management. I have accordingly drawn upon my own experience in Eastern Africa to spell out in detail the administrative reforms which Africa's faltering research institutions need. These suggestions are elaborated at some length because having useful research output is critical to the success of all other aspects of technology transfer.

- Every country needs a central mechanism for reviewing national crop priorities and for setting research objectives. The usual tendency has been to create huge committees of advisory scientists, but these are typically too cumbersome to serve as executive bodies (the 3-5 person policy team recommended above might provide this function).
- This research policy group could then serve as the secretariat to a larger consultative body (perhaps the National Agricultural Council) of scientists. It should also pass on the annual research budgets.
- Research stations themselves must be consolidated into a small number (3-6) of key sites rather than a huge network of weak stations. Politically, one solution is to group research stations by zone, upgrading the central institution in each zone to provide support and supervision to the others.
- Better use needs to be made of India's universities and research as a source of more appropriate technologies for much of the drier parts of Africa and Asia. It may be that ICRISAT and not IITA will emerge as the central node for developing the technologies needed by the drier lands.
- Wherever possible, foreign technical projects should be housed within the system rather than being allowed to establish independent and parallel research units.
- A farming systems research approach should be adopted for: i) advising on the content of research programs, ii) demarcating application zones and in general organizing environmental information, and, iii) cross-checking upon the feasibility of results.
- FSR's usual approach involving a multi-disciplinary problem team should become standard for most larger research projects, but this should not balloon into the expectation that all projects must have full-time specialists for all disciplines.
- Each major research station should establish a feasibility testing unit to screen all scientific results against farm level constraints before incorporating them into recommendations.
- The task of translating technical information and packaging it for extension use should be regarded as a skilled function beyond the capability of either research scientists or the Ministry's headquarters administrators. Probably this will entail establishing a centralized "agricultural information unit," though alternatively one or two extension/audio-visual specialists could be attached to each feasibility testing unit.
- Some means must be found to stabilize scientific staff--both local and expatriate--in their assignments long enough to carry experiments through to completion. This may require extra benefits to compensate for the isolation and lack of "normal" career advancement. An especial problem is to hold individuals at their task to the completion of projects.
- There are usually ways within the local system for recognizing and rewarding international publication by staff members. More recognition should be given to members' efforts to stay abreast of professional developments in their field.
- Annual meetings of all senior research staff should be held on a sector-wide basis, to encourage peer recognition of achievement and to build common understanding of each other's programs.

- Research scientists must be put under pressure to make direct field visits rather than relying upon formalized feedback from the Ministry. On these field visits, they should be used for training sessions and should take the local extension agents with them.
- A special unit for rapid handling of foreign exchange and import requirements may be necessary to insure that vital experiments are not disrupted by equipment failures. The Ministry should also employ 1-2 rotating technicians who are experts in repairing scientific equipment.
- Field stations should receive two-way radio communication so that advice on technical problems can be exchanged more easily.
- Each major research institution should be assigned a surrounding target area over which it has special responsibility for direct extension advice. This would help insure that research scientists pay more attention to actual farm problems and constraints.
- Whenever possible, both research and extension specialists should accompany field staff on the many seminars, conferences, and short courses which these days are being run by consultants under donor funding. Here the aim should be to accumulate "first cut" rough extension materials--transcribed lectures, slides, tapes, etc.--which after pilot testing on a second, locally organized seminar could be fed back into the system.
- Senior staff should be encouraged to attend the various ISNAR-linked international conferences and seminars. This would alert them to technological developments in neighbouring countries, and could serve as a reward for completion of useful local projects.
- The bottleneck in statistical analysis of raw data could be quite easily broken by introducing some of the new micro-computers and by publishing software suited to programmable hand-held calculators. Such assistance is long overdue, and could be made both a part of local university training and centered in one of the larger research institutes.
- Crop research scientists need to become sensitive to labor inputs and the riskiness of recommendations under average management. A major reason for the low acceptance of scientific recommendations in the past has been the scientists' refusal to take peasant constraints seriously.
- Given the complexity of tropical farming systems, system modelling must replace individual experiments, at least to the extent of screening which kinds of data are most urgently required. Often if coefficients are carefully derived they can be inserted into simulations done elsewhere and for other purposes. The international institutes could make it their special responsibility to compile accurate coefficients and to exchange these with programs needing production estimates.
- The low caliber of supporting staff at many research institutes probably requires a centralized, in-country training program. This should be designed to reward technicians who do careful work on-the-job, rather than becoming a pre-entry course.
- Developing improved genetic material is for some types of plants a slow and extremely time-consuming task. In the tropics it may sometimes be feasible to copy India and Mexico in moving seeds from one zone to another to get two or even three cropping cycles in a year. More generally, for long-run programs a university environment may be more suitable than a ministry-run station.
- Bulking of either plants or extension materials is expensive, and best left to commercial suppliers wherever possible. This means that the ministry must be prepared to pay for what it wants.

The above suggestions provide raw material for the formulation of better research programs, but only that. Someone must still select which policies are needed in which countries. Here the difficulty is that the agronomists who usually receive such tasks tend to perceive situational needs in substantive terms, e.g. more effort on synthetic maize or on cassava mosaic, and so forth. Few natural scientists have been trained to conceptualize technical problems in an organizational framework, to see where the procedural bottlenecks lie. This is why a capacity building approach should be adopted in place of substantive inputs into particular crop research programs. Otherwise the efforts taken to improve research capacity can easily become absorbed by the nearly infinite funding needs of particular crop programs.

Finding the right analysts to design remedial programs will not be easy. Devres Inc. is reported to have funding (in conjunction with NUCIA) to inventory African research needs and performance in the SAREC and SAHEL countries. It is critically important that such a review be carefully conducted: i) to generate comparable assessments from country to country, ii) to establish firmly where underutilized technological breakthroughs exist, and, iii) to pinpoint the systemic weaknesses in each national research network. An additional question which ought to be addressed is to see whether the special strengths of Kenya's and Zimbabwe's scientific establishment might be made more readily available to the SAREC region as a whole. Unfortunately, a private firm is unlikely to have particular strengths for doing this kind of analysis. Senior research managers from out of CIMMYT or IRRI's past programs might stand a better chance, but even these officials are not used to giving adequate weight to in-country institutional limitations (as Swanson's follow-up of their research trainees indicates). Perhaps the recently established long-term ISNAR training program (in Holland) might also be drawn upon, with trainees doing case studies on their own country programs while the trainees are on released time for the ISNAR course. Ken Anthony, formerly in charge of agricultural research in ODA, Bruce Johnston of Stanford, and Burton Swanson of Illinois would be the kind of outsiders needed to round-out such a team and insure its success. Hopefully, this might be what Devres Inc. will try to accomplish for USAID.

4) Redirect MS Training Towards Practical Problems. Our message throughout this paper has been that scientific work on technology transfers is not by itself enough: other kinds of information and diagnosis related to the contexts of technological diffusion are also necessary. To meet this need, I suggest in-country MS training might be redirected through a nationally-funded program to concentrate upon urgent field problems. The rationale is as follows.

In most LDCs, Masters' level training is an unappreciated resource, regarded as a pro forma requirement which individuals must meet before they are promoted. It deserves to be taken far more seriously than this. First, the more glamorous Ph.D. training takes too long, is too academic, and often siphons promising staff out of field assignments into academic careers. MS training by way of contrast affects much larger numbers of staff, for whom it is generally the terminal phase of their professional preparation. In most public sector agencies, the MS holders constitute the core of the organization's specialized technical staff. Second, there is usually already an established tradition of MS degrees based on both coursework and a thesis. This insures that students can get a thorough and up-to-date conceptual foundation in the fields related to their interest. Third, MS theses are usually completed within the year that they are begun. Students have a high incentive to finish the thesis, which insures rapid feedback in the form of a completed report--something which otherwise often becomes a bottleneck when academic researchers are assigned to work on practical problems. Fourth, the university staff are usually more relaxed about MS thesis topics, permitting descriptive and cross-disciplinary topics which they would not accept at the Ph.D. level. And, lastly, strong MS training is within reach of present LDC academic resources (while Ph.D. work may not be).

These advantages provide an opportunity to use the Master's thesis as a tool for exploring applied topics by researchers who are already employed in related public agencies. My proposal would be to fund a national program for applied research at the M.S. level, using as a reward both promotions and the prospect of overseas Ph.D. training for the small minority who show exceptional theoretical ability. Meanwhile the stream of MS theses should be published as they are submitted, giving a widening pool of up-to-date case studies and localized experience for other students to draw upon. MS students might also be assigned to work with outside consultants, insuring that technical assistance surveys leave behind somebody able to interpret the results. To be fully effective, this program would require donors' agreement not to send local students overseas for Bachelor's and Master's level training.

5) Prepare Organized Support for the T & V System. Once objectives are clarified and new technologies available, it then becomes feasible to insert a modified version of Benor's "training and visit" system. We must recognize that the "T & V" approach generates strong up-stream requirements for planning, extension materials, and additional technical recommendations. It also is dangerous if field recommendations have not been thoroughly screened within an FSR framework. Before it can come into continuous operation, "T & V" needs five kinds of support (beyond the obvious initial requirement of an attractive technology):

- a) a nucleus of staff at the headquarters who will do the liaison and scheduling required by the approach. To fit the content of training sessions into the farming cycle and to structure them sequentially takes a high level of curriculum skill, and cannot be left to chance. Alternatively, this unit might be based at the in-service training facility (see recommendation 6 below).
- b) an operating materials production unit, capable of generating the simple extension handouts that will accompany the selection of biweekly training topics. This capability will not at first seem essential, because in most countries there are some underutilized extension materials. Over the longer run, however, T & V cannot be maintained without regular input of this nature or else it will degenerate into routine briefing sessions devoid of accurate technical content.
- c) identification of farming system zones, to act as the domains for diffusion efforts on particular technologies. These zones should be determined scientifically by an FSR team. They should not be simply the Ministry's ideas of crop production priorities.
- d) clarification of supervisory spans and lines of control, to insure that work loads are reasonable and that field staff do possess the resources to carry out their assigned tasks. If job assignments are not realistic, the "T & V" system will soon lose its effectiveness.
- e) recruitment of a panel of 'subject matter' specialists, who can insure that recommendations are accurate and who can train the ministry's own "T & V" trainers. The system leaves unstated how the various types of staff it requires will be organizationally interrelated.

If the purpose of T & V is continuous, downwards communication from the research system to field agents, then it requires far more organizational preparation than its proponents admit. In this case, however, the types of "backstopping" required by T & V would in any event be quite beneficial for a ministry of agriculture's usual operations. Even without launching T & V any initiatives which strengthen a ministry's internal planning and support capabilities are to be welcomed. If the official adoption of a "T & V System" can be made the excuse for buttressing a ministry's internal support functions, so much to the better.

6) Clustering of Extension Functions. Improved managerial procedures are not enough: there must also be a structural clarification concerning where to locate responsibility for the various extension functions. A weakness of many existing extension systems in Africa is their monolithic structure, which puts total responsibility on the shoulders of the district head of the agricultural ministry (or DAO as he is often called). My proposal here envisions a goal of having three senior staff members representing the Ministry of Agriculture in each district. While one would be in operational charge, the other two should hold equivalent bureaucratic rank and could deputize for the district supervisor on many occasions (and thereby making internal promotion possible to minimize discontinuities caused by transfers). These three would then manage the following four clusters of extension tasks.

The first can be described as comprising all the activities related to information delivery: supervising research field trials, selecting technical recommendations, organizing farm demonstrations, and managing the cadre of field extension agents. These duties fit the classic 'T & V' model which has already been described. Preferably, however, the network of field agents should not be organized into a steep hierarchy; and there is need for much experimentation in evolving a more collaborative style of task assignment and supervision. Benor is probably correct to suggest that the Ministry of Agriculture should have a distinct "extension service" as one of its main divisions, and that staff with these information delivery roles should not be asked to carry out other tasks such as supervising credit or gathering statistics. He is however quite wrong to assume that a District Agricultural Office can dispense with these other functions altogether.

Thus the second cluster of functions revolves around agricultural economic considerations: price policies, cash crop development, loan programs, input availability, storage, marketing performance, and transport adequacy. These are the commercial aspects of agricultural development, provided by private firms in many instances but also sometimes by marketing co-operatives. They are critically important, and must be monitored continuously by the Ministry of Agriculture irrespective of who actually provides the service. Such duties combine easily with the planning and information roles which absorb so much effort: agricultural censuses, statistical and price reports, baseline surveys, etc. All in all, these are more than enough work for one full-time staff position, preferably filled by an agricultural economist

Moris

representing the Ministry's Planning Division. This person should have direct access to the various cash crop authorities, being an ex-officio member of any local management boards, and would be held generally responsible for coordinating the inter-organizational matrix.

The third set of functions cross-cuts the others, and involves creating an institutional capability for doing training, for responding to the special needs of youth and women, and for drawing in outside organizations like the cooperatives or voluntary agencies. Such functions simply do not combine well with executive-style "top-down" information delivery. They need a more relaxed organizational base, a "home" to which farmers and farmers' groups may come even when their demands fall outside the ministry's normal program. Many African districts already contain a farmers institute (or FTC) of some sort. Such an institute should be linked to the ministry's Training Division, and would furnish a suitable location for specialized functions like land-use planning, solar energy demonstrations, soil surveys, disease diagnosis, etc. Here too would be offices for women's programs, radio listening groups, school leaver training, village woodlots, fishpond promotion, appropriate technology, and probably a library of simple technical references. The farmers' institute could be the site for many T & V training sessions, which I suggest might occur monthly to take advantage of days when field staff arrive to collect their salaries.

The above allocation leaves out one final category of extension activities: the "catalytic" or "problem resolution" aspect. It is quite clear that on many occasions in Africa the extension workers need to work with farmers to meet village needs. This requires a "bottom-up", participatory style which the "information delivery" approach does not encourage. Indeed, the values and mind-set it draws upon differ at almost every point with what "top-down" bureaucratically-oriented programs provide (here see my discussion of "approach ideologies", 1981:89-96). (Voluntary agency staff are usually better at this role than are civil servants, for precisely this reason.) Since we cannot afford to establish a parallel hierarchy of "animateurs", the problem-solving function must be built into the other three functional areas by procedural means. Specifically, field agents need to become downwardly accountable to assigned neighbourhoods; they should be required to work closely with village governments or committees; and their progress should be measured in terms of local problems solved.

7) Structured Organizational Feedback. A danger of the "technology transfer" concept is its implicit assumption that downwards communication is what matters. In point of fact, many of the mistakes agricultural agencies make reflect poor upwards communication. Moving messages down through a hierarchy is relatively easy; moving them upwards is not. Here Jedlicka has employed Likert's concept of a "linking-pin" organizational structure to urge how extension agents can tap the knowledge of small, well-organized client groups (1977). Let us assume following Jedlicka that the field agents do know what is going on--a dangerous assumption, but other measures in this package are intended to rectify that weakness--how do we get such feedback communicated back upwards through the system?

- A principal reason for wanting three instead of one senior staff at the district level (see our preceding suggestion) is so that there will always be more than one channel open into the system above. Just knowing this fact has a significant effect on the assumptions and behavior of the district supervisor, making it less attractive for this individual to attempt to monopolize or delay information.
- Likert's model stresses the key functional significance of having the same person a member of different groups, in one context receiving field information and in another passing it on upwards. We shall assume that personal contact is more effective than formal reports, as indeed most studies of managerial communication show.
- An effective method for achieving structured communication is to hold the major meetings at different levels in the hierarchy in sequence. For example, at a given time all district staff might meet; the following week, all district heads might participate in provincial reviews; and the week after that, all provincial heads in ministry-wide conferences. This is already what happens during the budgetary process, but it should also be employed for reviewing performance more generally. If a major problem does emerge at the district level, two weeks later the provincial head may bring it to the attention of the Ministry's agricultural policy team. So also in reverse, when the national leadership wants extra preparation for some new program.
- The value of provincial and national meetings could be enhanced if they are planned more carefully. For example, the divisional conferences might rotate to be held at the site of major projects or research and training institutions around the country. At each conference, one day might be devoted to field visits and a critical review of local problems. At a minimum, all divisions should hold one annual conference each year, and this should be a carefully planned event with widened membership to include commercial interests and other divisions.
- Clear guidelines should be issued to promote open communication and the taking of direct action to resolve problems, if necessary across agency lines. There is a simple way to do this bureaucratically: allow those taking action to sign for themselves, and accept copies to the relevant agency heads as being sufficient basis for proceeding.

8) Develop a Middle-Management Package. In many agricultural agencies, a managerial breakdown occurs at the juncture between the middle and lower administrative levels. We have pointed out David Leonard's finding that when individual middle-managers are put under pressure, they tend to adopt supervisory tactics which increase organizational malfunctioning (1977:82). A main reason this can happen is that often middle-managers have attained their position by virtue of advanced education and not experienced leadership. In some countries the national elite are sharply distinct from the struggling lower levels of agency employees. Furthermore, local staff face many constraints--in transport, budgets, technical knowledge, and equipment--which their superiors control. Thus there is an obvious case for looking closely at what middle managers do, in order to insert more appropriate managerial procedures and (hopefully) to effect attitudinal changes (e.g., DPMC's "performance management" would be highly relevant).

The starting point might be to visualize the resources which a typical district extension office has at its disposal. What is needed to use them more effectively? The District Manager might require teamwork building skills, practice in task delegation, systematic use of the end-of-month salary payout (when most field staff come in to receive their wages), innovative methods for employee evaluation, ploys to make optimum use of scarce transport and fuel, ways to plan the annual and seasonal extension program, data needed to determine crop zones, and so forth. Kulp (1977) has provided an entire planning system suited to district-wide adoption, one based upon his earlier work in Uganda and in Vietnam. But there are undoubtedly other equally promising versions in existence, e.g. Waterston's "Coverdale Approach" (?), Roskelley's "Farmer Scholar Program", and DPMC's "Performance Based Management".

There are several international management training programs which might be encouraged to take on the particular problems of middle-level agricultural sector management: the Managua Center in Swaziland or ESAMI in Arusha would be good candidates, but there are no doubt several others. What we need are a few skilled professionals (2-3) who can work as a team in diagnosing typical managerial bottlenecks at the district level, assembling a range of organizational technologies for review, and then monitoring actual experimentation in several countries while feeding back the results as case-studies into regional staff training seminars. (FAO does in fact have such a project in its plans.) Successful packages could then be fed into the various national training programs.

9) Reform the Budgeting Process. It was noted earlier that budgetary procedures have a major impact within any administrative system. They exert an especially large influence on field agricultural services, however. In general, agricultural extension agents are posted into the more remote areas. They are the first to suffer when the Ministry exhausts its recurrent funds or decides to curtail transport. It is their trips which get cancelled when fuel is short. A second source of trouble occurs where in many African nations the financial year straddles the seasonal year; sometimes the greatest financial demand in farming occurs at the very end of the government's accounting year (when further disbursement may be forbidden). Thirdly, agricultural enterprises need rapid action whereas public disbursement is typically sluggish. For these reasons, the extension services have a great deal at stake whenever budgetary reform is being considered. The goals to aim for would include:

- Find ways to adjust the funding year to match the agricultural year.
- Allow any agencies operating production farms to re-utilize funds without returning them to the treasury, thereby rewarding thrift and giving some cushion against emergency needs. (In ex-British countries the way to accomplish this is to open an "imprest" account.)
- Integrate the three main budgets--for manpower, capital investment, and operational (or "recurrent") funding--into a common planning process. The cross-linkage of all three components must be maintained throughout the budgetary review. In practice, this will mean that three government agencies must participate: the economic planners, treasury, and the educational or manpower planners.
- Downplay the concentration upon new projects (the investment budget) in favor of giving sustained review to how well existing projects are being completed.
- Use the budgeting process as the main occasion for identifying systemic constraints which inhibit project implementation. Once so identified, the elimination of such constraints should take precedence over all other new projects.
- Also use budgeting as an opportunity to compute actual depreciation rates, e.g. how long has it been since unit x last received this kind of assistance? There is need in many countries to revise procedures for incorporating depreciation charges, so that operational units can move towards self-sustaining operation rather than coming back again and again for bail-out.
- Planners should insist upon employment of average coefficients when estimating equipment life and project benefits. They should also compile evidence of actual managerial levels rather than "best ever" or ideal situations.
- A door should be left open for some local submissions from the village level outside the formal planning process, to serve as an incentive to field agents and their clients.
- Find more effective ways of deciding when to cut off unproductive projects.
- Add completion indicators to time budgets so that delays will be flagged as soon as they begin to occur.

10) Initiate Staff Retraining. LDC educational systems generally embody a formalistic concept of technical education, which emphasizes pre-entry occupational training. Once appointed, extension staff receive little further technical training except insofar as their duties might involve them in occasional field seminars. This preoccupation with initial training was at first necessary while large numbers of young employees were being recruited into newly established extension services. After two decades, however, most African nations now have at least several hundred and sometimes several thousand extension employees. At this stage it makes sense to shift attention towards the necessary retraining of field staff with up-to-date technical skills and information. Ministries of Education in many African countries have already made this adjustment, by establishing national centers for the in-service training of teachers (usually a 6-12 month upgrading course). Why not do the same in the agricultural field, with a national "refresher" or "in-service" training program (what we in the US call "continuing education")?

If such an institute were based at the main agricultural university, it should be given separate facilities to safeguard against its space being pre-empted by first degree students. Alternatively, it might be placed at the country's main research institution, which would make the teaching of technical subjects easier. Or it might be at one of the Ministry's own diploma agricultural colleges. A main consideration in making the choice should be to insure that it has access to good library facilities in the agricultural fields and to outside specialists as lecturers. Obviously, experimental plots and laboratories would be needed. A nucleus of this kind might even become the base for the Ministry's own Training Division, thereby minimizing bureaucratic friction. It could also house curriculum specialists working in the agricultural fields, and perhaps a training program for vocational agriculture or farmer training tutors. A neat organizational link-up to the mainline extension programs would be to make the Center's teaching staff the subject matter specialists for the T & V system (as already recommended above). Indeed, performance in the T & V training sessions by field staff might be used as a criteria for selecting trainees (and thus promotion if they do well).

The content of refresher course training should be both technical and managerial in nature. Many of the innovations we are recommending here do require the full understanding and cooperation of the field staff. Intensive retraining of staff would be an ideal way to launch such efforts nationally.

11) Organize Contact Networks. The ratio of field agents (1:300-1:3,000) to farm families in Africa makes it physically impossible for full-time staff visits to every family. If then extension workers necessarily deal with a selection of farmers, the key question remains how this selection should be structured to gain maximum impact. Should farmers be registered, with accompanying records of what advice is given on each visit (the KTDA system)? Could part-time staff paid low salaries do a more effective job than the full-time outsiders (e.g. Mexico's Conafe program, Paul 1982)? Should the communities themselves select "farmer scholars" to receive training on their behalf (the Roskelley system)? Might field agents instead work with groups of farmers, as Leonard recommends? Could the areas receiving assistance be rotated, as USAID attempted to do in Uganda in the late 1960s under the "saturation" approach (see Kulp 1977)? Or is it sufficient to help the top 13% (the "early adopters") if there is already a two-step communication process in effect (meaning that since the poorer farmers are not in touch with outside sources they will anyway have to learn about innovations from their neighbours)? Perhaps the field agent should maintain a changing roster of "contact farmers" on whose fields demonstrations are organized (the T & V system)?

There is no ideal or single most effective answer to this dilemma.

It is unfortunate that each of the favored solutions may have complications which make it unsuitable in particular African contexts. In African communities, for example, the use of lowly paid, part-time agents gets sabotaged by the strong pressures villagers can exert to employ their own "school leavers". From the individual family's perspective this makes sense, since they have a large investment in a son's education and even poorly paid work is preferable to none at all. For precisely this reason, attempts in other African programs (mainly adult education and rural health) to draw upon locally employed staff find themselves swamped with young men who are not respected as advisors at home and who then lobby energetically for special entrance into formal training at higher levels. Again, the hope that early adopters will diffuse new technologies to their neighbours works in communities where resources are evenly spread, but backfires if there is a wide gap between richer and poorer farmers.¹ The tremendous difficulties India has experienced during three decades of experimentation with "village level workers" would indicate there are no automatically efficient organizational solutions.

¹A finding supported by King's comparison of Nigerian co-ops (1981) and Freeman et al. (1982) of Pakistani farm practice adoption.

My own preferences based on the East African experience are as follows:

- Where well organized farmers' groups exist--co-operatives, ranching associations, etc.--they should certainly be used as a multiplier of the individual contact agent's efforts. However such group-focussed efforts should not take up more than one day per week, since membership is often biased and in many settings cooperatives are either corrupt or ineffective (here again see King 1981).
- Some system for registering a known listing of "contact farmers" (along T & V lines) would greatly facilitate supervision. However this should be an open-ended registry, with approximately 30% turnover per annum so that the extension worker's efforts do not become overconcentrated upon a small clique. There will need to be clear guidelines about how participating farmers are chosen, and when they should be replaced.
- We need to devote more attention to the issue of what extension agents do on farm visits, and how they record where they have been. A simple system for recording technical advice in duplicate--one sheet for the farmer and one for the agent--would make it feasible for field supervisors to cross-check the quality of field advice.
- Use of older, part-time workers who reside within communities is still highly desirable as an alternative to having bottom-level staff comprised of full-time agents. However the selection of such staff must be carefully controlled to give villages the major say and to insure nobody under 35 gets appointed. This would appear to be a feasible area for project experimentation under some of the larger 'integrated rural development' programs.
- We should recognize that because of the severe technical problems full-time agents require about three years of scientific training, perhaps the first two devoted to a general review of crops and livestock subjects and the third to a specialty area (mechanization, land use planning, crop protection, etc.). Before taking on different assignments, field staff would then need to retake their final year's training in the new area of specialization.
- Appointments which entail this large an investment per worker ought to be given at a minimum motorcycle transport, a set of basic technical materials, a solar-powered calculator, and perhaps radiocall contact to the district agricultural office. This implies putting a larger proportion of the budget into equipment, but it is essential if the morale and commitment of field agents are to be maintained.
- Field agents require clearcut work routines which they know can be checked and which make their visits predictable. The T & V training sessions should be combined with the monthly trips to headquarters for salaries, perhaps by making these into a structured, two-day affair.
- Field agents could be involved in the formation of annual work plans for their territory. In place of the meaningless monthly reports now submitted, a quarterly report should suffice. This should emphasize actual achievements, and should incorporate forward plans for the next quarter.
- As part of the Annual Work Plan, one new target community should be identified in each year to receive extra effort (along lines Kulp recommends).

- When special courses or seminars are set up for farmers, it helps if they are recruited in groups from given communities and if the extension agent is expected to attend with them. This automatically creates a support group for any innovations the farmers decide to try out.
- There is also room for linking extension outreach to packaged media programs, such as radio listening groups or functional literacy classes.
- We should recognize that poor or isolated communities may require special procedures to keep field agents from concentrating only on the elite.
- Special technologies suited to extremely small holding or low capital input situations need to be devised. Probably these will emphasize horticulture and legumes rather than arable field farming.
- The recruitment of young, school age extension staff should be avoided. One experiment would be to recruit only married staff, perhaps those willing to accept a housing loan and to put down roots in the community.
- A principal aim should be to get extension staff to actually reside in the villages they serve and to stay in each assignment 3-4 years.
- There should be overlapping channels for upwards communication, at both farm and contact agent levels. This means that when problems arise, those who are affected should have several ways of getting higher level attention.

While these proposals make sense from an East African perspective, they should not be applied uncritically into other settings. The unfortunate truth is that we do not know enough about the actual constraints and perceptions which perpetuate low morale and poor extension performance in so many LDCs. Comparative studies of the contact level in service delivery systems are urgently needed (an appropriate topic for donor support).

12) Make Staff Downwardly Accountable. Nobody seems to know how to implement our last reform, but many authors agree it needs doing: getting field extension agents to represent their communities rather than their employers. This is in essence the difference between a "government servant" and a "farm advisor". Historically in the US this was sometimes achieved by having the local community contribute part of each agent's salary--a solution which is however not feasible if peasants are still only at the subsistence level. Perhaps communities should be consulted when agents are being recommended for training or promotion. Or all new appointees might start their career with two field tours before receiving permanent assignment to a particular division in the Ministry, with communities registering their views about a candidate's strong and weak points. What we can say at this point is that the issue deserves further experimentation and analysis.

4. Donor Support

When so many initiatives are required, is extension reform even a suitable area for donor intervention? The de facto answer at the moment is largely negative: despite much lip service to the need for effective extension, the only major donor that is heavily involved in this area is the World Bank--and then only in support of its one aspect, the "T & V" system. For the rest, present assistance takes the form of training scholarships, the occasional field manual on topics like applied nutrition, and now and then sponsorship of a regional seminar or two. Compared to the ample funding going into irrigation, input delivery systems, integrated rural development, or even farming system research, the amount of sustained donor support targeted at extension as a function is negligible.

There are, nevertheless, many useful extension functions which donors could assist short of the all-out attack on ministerial productivity (which the preceding section outlines). True, to reverse general trends would at this point in time require a large effort attacking several bottlenecks simultaneously; but this should not rule out the consideration of smaller initiatives. If by taking prudent steps an external agency can relieve critical constraints in the local system, or speed the adoption of high yield technologies, or maybe even avert unnecessary famine--then there is every reason to act. At a minimum, donor agencies should increase their own competency to understand the processes of rural development and to analyze typical extension problems so that when opportunities occur they will be seen as such. Furthermore, many presently funded activities such as participant training, attendance at regional conferences, circulation of consultants' reports, conduct of evaluations, and offering of food aid in times of crisis could be employed in a far more effective fashion to amplify the capacity of host country institutions.

What, then, are the individual opportunities for enhancing extension effectiveness which the major donors such as USAID or the World Bank should consider?

1) International consolidation of program experience. We cannot realistically expect the smaller LCDs to do much in the way of consolidating program experience. The range of their own programs in any one area is too small, and the turnover of external experts too high. It is also often not possible politically for a country to look over the fence at how its neighbours are doing, and when LDC delegations get together they tend to make inflated claims for their home programs.

Examples of such efforts would be Kline's 1969 review of farm mechanization in Africa, or Chandler's 1979 summarization of Asian rice production experience. Comprehensive and well-grounded 'state-of-the-art' volumes of this nature are of great value to guide teaching and research in the smaller LDCs. They also feed third world data back into US graduate training, where many future LDC extension officials are enrolled. Currently the World Bank and Canada's IDRC do a good job in this regard, so perhaps the role of other donors should be to give modest assistance to see that key works get into LDC libraries. Similarly, the proceedings of issue-oriented conferences being held these days at the international agricultural institutes deserve much wider circulation both to LDCs and to US universities. A third area where all donors could improve would be to get more of lasting value from the tidal wave of project documentation which is presently produced at substantial cost and then rapidly discarded. The main pre-project paper and the terminal evaluation merit wider distribution, since together these documents facilitate longitudinal learning and each is of a nature where it is likely to contain summarizations of current experience. The World Bank, in particular, needs to make such documents more readily available within country to research and training institutions.

2) Technology screening by donors. A problem all the major donors currently encounter is the vested interest which is created by project appraisal techniques in assuming that embedded technologies are effective. If one reads World Bank project submissions of the mid-1970s for Africa, one would have difficulty understanding why there should be any yield problems at present. (USAID projects are not that much more realistic!) In truth, this optimistic bias arises because without projecting a favorable benefit stream a project is unlikely to be funded. Somehow during the process of project preparation the agronomic projections tend to become givens, not variables. We see huge project empires being created in Africa where the technological base is faulty, if not even nonexistent.

Consequently the donors need to find some way of reintroducing the question of technology choice at a high level, both in searching for new alternatives and in pinpointing the riskiness of present assumptions. Such inputs must occur outside of and above the normal project review process, being directed at long run goals rather than immediate activities. I suggest that it would be well worthwhile to retain 2-3 experienced, field specialists who might deal with the technological issues for each continent--one for crops, one for natural resources, and one for livestock. Such individuals should spend most of their time circulating between countries and institutes, putting isolated field scientists in touch with each other, recognizing promising innovations when they first occur, and generally serving as 'on-deck' reviewers of technological potential on each continent. At the moment (insofar as I can tell from this distance) we do not really know what are the highest promise technologies for Africa, nor do we plan the distribution of funding with an awareness of the major gaps in our present knowledge. It does seem that through ICRISAT's, IRRI's and the Asian Development Bank's efforts the technology screening function is being more adequately met in Asia, though probably not in regard to rainfed agriculture.

How to find such people--there are never very many available--and where to base them are separate issues. In the past Rockefeller has done a more effective job in this regard than have the large donors. Alternatively, some discreet upgrading of FAO's staffing might accomplish this purpose. A third option would be to employ staff of this nature on a rotating (say 5 year) basis, on IPA-type loan not to USAID but rather to a base of operations at one of the field institutes (like ICRISAT). As a staff resource at a regional center, the individual would be in touch with many of the host-country nationals who attend specialized conferences and courses, thus building up a network which could be used on field visits. At the same time he or she could help suggest to donors the key topics needing further examination and support.

3) Drought aid leverage. The one certain prediction we can make is that African nations will encounter famine crises from time to time (as indeed several are experiencing this crop season). Such events may provide an occasion when the political leadership may accept reforms which otherwise could not be countenanced. Similarly, an influx of refugees may on occasion present an opportunity for rebuilding local systems from scratch. To take decisive advantage of these opportunities, donors need to develop a package of reform measures which could be quickly inserted as an adjunct to the giving of food aid or offering of other types of relief. Such actions cannot be planned on an ad hoc basis after the crisis arrives, because the individual components generally require more careful preparation than can be mustered in an emergency--which is why it is probably already too late to implement such a policy in connection with Africa's mid-1983 food crisis. A milder version of this approach which is already in partial effect is to tie offering of PL 480 food aid to acceptance of in-country extension reform.

4) Sustained project completion. Donors do need to reexamine their entire approach to the "project cycle", which at present focusses intense effort in the first half of project life. The existing procedures in use by all major donors reward their country missions for developing new projects rather than for completing old ones. There is a key period in the life of many projects--generally in my experience the last third of the funded activities--where sustained pressure is critical if the project is to take firm root in its environment. By then a nearly complete project team will be in post, vehicles and housing are adequate, and the staff know enough to make sensible modifications to their program. At just this time, however, the pressure to switch to a new emphasis grows within the country Mission's staff. Conflicts between the contractor and the Mission may surface; budgetary ceilings are reached; "misappropriation" of equipment or support may emerge; and in general the better staff begin to anticipate project termination and leave. Yet this is the time when a project must become incorporated into the local system if it is to continue, and when field activities begin to generate real benefits which farmers can see. Frequently the phasing out of support comes at an awkward moment when participants are just returning from US training and the local teams can finally begin to deliver the goods. Loss of donor support then triggers compensatory adjustments by the host country which in a short time wipe out nearly everything which the project tried to establish. Extension outputs are particularly vulnerable, because often the ingredients (proven technical packages, field-tested training materials, etc.) are not available until late in the project cycle.

5) Facilitate between country exchanges of technical materials. Again and again one sees neighbouring countries growing the same crops and with similar environments nevertheless devising technical materials (on crops, diseases, etc.) from scratch. The one outstanding feature of much agricultural information is its non-proprietary nature. Yet because of national chauvanism, each Ministry of Agriculture will be determined to develop such materials afresh. Here is where regionally-based technical assistance staff could discreetly supply comparative materials from other countries to those doing the initial production. The case for materials exchange is particularly strong in Latin America, where Spanish language units would require only minor adaptation from country to country. And, of course, Spanish is the only other world language where many US universities already have a minimum level of technical proficiency.

6) Create US based extension expertise. "Extension education" in the US has relatively little to offer for LDCs, an observation which some may find upsetting but which is nevertheless true. These days the small amount of excitement in the whole field of LDC extension is coming out of England, not the USA. The Agricultural Administration Unit at GDI, the journal Agricultural Administration, the addition of two new abstracts to the Commonwealth Bureaux series (on Rural Development and on Rural Extension, Education and Training)--these are all U.K. developments.

If the US is to play a more active role in assisting LDC extension systems, it must first create 2-3 centers where international extension can be studied and where first rate analysis and instruction goes on. Wisconsin and Cornell are the nearest to having a genuine international bias in their extension training, but in neither school do we see the necessary cross linkage to development administration. Alternatively, the World Bank and FAO might pay more attention to building up a US network of international extension experts available for short LDC assignments.

At the very minimum, we do need badly a good basic text on international agricultural extension, and also a cross-national comparison of extension systems. The raw materials for such a comparison exist in abundance within USAID and the World Bank files. More fundamentally, better conceptual analysis is required to bridge the various academic professions. Agricultural extension topics are related to diffusion theory, organization theory, cross-cultural management, development administration, economic anthropology, agricultural economics, agronomy, communications' theory, and adult education. Hardly any of those active in the field at present are familiar with more than 2-3 of these disciplines. Yet there are large literatures in each of these fields, with some excellent case materials which extension trainers could draw upon if they knew they existed. Finally, we do also need comparative research on access bureaucracies in the LDCs (our "contact cadre" problem).

7) Improve Participant Training in the US. The large number of LDC staff in extension-related fields who come to the USA for either short (USDA, EDI) or longer term participant training affords a major opportunity. First, the possibilities for giving in-depth training support (diversified methods, country-specific materials, up-to-date texts, etc.) are considerably better here in the USA than in the dispersed, host-country networks. Second, the mechanism for placement is already in place (at least insofar as USAID's participants are concerned), since most of these come through USDA's placement system.

A critical area for improvement is to get more contextually grounded and relevant training into EDI and USDA's short course programs, which handle the bulk of short duration training. Both programs are highly structured, and at present emphasize US managerial techniques (project appraisal, etc.). It would not take a great deal more effort to interject a greater stress upon implementation, upon problem analysis suited to typical LDC conditions, and upon realistic extension situations into such training. In addition, trainees should leave with a good basic selection of recent state-of-the-art papers in their fields.

Similarly in regard to longer term, university-based training. Here the need is to upgrade US advisors' knowledge of host-country materials, to pick the topics for short-course summer training more carefully, and to get more thesis topics on home country applied problems. Given that the participants' training is already funded, we have every incentive to try to get a more interdisciplinary, agricultural management focus into its content. The case materials available to support such training are at the moment considerably better than what is actually being given to LDC trainees.

8) Identify a recipient 'land-grant' type institution in each country.

A major step towards creating an in-country "institutional memory" would occur if within each nation the donors were to select one agricultural university to act as the continuing repository of project "spin-off" benefits. There are usually some residual aspects of each rural development project: where field reviews and evaluations are conducted, training seminars, and circulation of project reports. It would not take major changes to insure that these "fall-out" benefits are concentrated upon a single local institution, and to assist that institution in circulating any products to a wider network of linked research and training institutes within the country. For example, on larger evaluation or sector reviews the USAID or World Bank resident missions might be encouraged to hold these within the local institution's facilities (rather than in the Mission offices as being presently done). Training seminars are more productive if held within an organization that can use the materials and replicate them for future use. Evaluation reports should be routinely deposited in the host-country institution, which would be better placed to circulate them than the ministry is. While these seem to be small changes, over time they would accumulate and reinforce each other. At present, technical assistance staff often act as if they are still living in the 1930s insofar as reliance upon the local institutional network is concerned. If we insist our own agricultural universities should be the centerpiece for technological generation and transfer in the USA, why cannot we accord LDC institutions the same place in their own systems?

9) Make better use of the international agricultural institutes.

A strong case could be made that the international institutes could serve as the intermediary institutions for regionalized technology generation/diffusion. In general they have a longer-run perspective than host-country institutions, and they are free from the burden of immediate operational demands. They are also a more attractive site for basing US applied science professionals, and for putting such staff into direct contact with scientists throughout an entire region. It would also be desirable to equip the international institutes with modern copying and micro-computer facilities, so that they could act as disseminators of a wide range of reports, data analysis software, and case study materials. All that would be required would be to broaden our concept of the role of these institutes from being merely concerned with hard science technology generation/training to include the extension, organizational, and agricultural administration aspects (here see Burton Swanson's several publications and also Brady's chapter on IRRI's training). Given the diversity of institutes and my lack of direct experience in this area, it would not be appropriate to make specific recommendations at this point in time. However it seems obvious that the international institute network remains a valuable resource for upgrading extension capabilities within each region.

10) Media/software assistance in technical fields.

Extension and rural development staff have been slow to capitalize on the tremendous technological potential of television and of microcomputer. We now have on the market single unit, hand holdable battery operated videorecorders, just as we can carry our microcomputers with us. These technological breakthroughs are already present, and are bound to become established in all LDCs. Yet relatively little innovative work is being done on the extension/materials dissemination aspects of using this potential for transfer of applied science information. What LDCs need is expert assistance in how to "feed" field materials and suitable software into the hardware they are already purchasing. We know that this can be very expensive, but if done intelligently it can also be quite cheap. Here ought to be a major area of donor assistance, using the "hardware" to backstop other aspects of program organization more effectively.

CONCLUSION

Our review of actual and potential agricultural extension performance has highlighted the complex interlinkages between agency characteristics, the faulty technological base, the larger bureaucratic environment, and the constraints imposed by the increasingly negative "development" trends (see Appendix I). No doubt a more hopeful analysis would have emerged had we dealt with the Asian situation, where both the emergent trends and organizational performance appear more promising, and where irrigated high yield varieties are transforming farm productivity. But this paper has dealt with Africa as it is today, and with the present (rather than potential) technologies.

What we have argued throughout is that the above components are in Africa strongly interrelated. A focus on any one component--say on food production or generating new technologies--is unlikely to be effective over the longer run. The measures we have recommended (part III) cross-cut all stages in the technology generation-and-diffusion process (see Table 7 overleaf). A promising start has been made by the donors in funding a vastly increased amount of "farming system research" (FSR). However this should be viewed as only the first step. To use FSR results effectively, African agricultural agencies need to develop greatly their extremely limited capacity for handling technical information (creating what we termed 'T and V' support institutions). They also require a clearer idea about how to manage field extension activities in ways that meet farmers' needs. Simultaneously the larger bureaucratic environment must be changed to encourage the kinds of managerial behavior that will assist rather than retard effective field activities. We have insisted that the root pathology at present is that administrators within the system have rational reasons for acting in ways that sabotage organizational goals.

The principal operational difficulties to overcome are twofold: i) these changes require multiple interventions at several levels, something difficult to accomplish in any operational bureaucracy; and, ii) current trends in Africa are strongly adverse to improving agency productivity. This report tries to pinpoint what needs to be done to regain control; it does not give an easy recipe describing how to get these reforms adopted in actual practice.

Table 6. Location of Interventions in the System

| <u>Institution:</u> | <u>Type of Intervention Recommended:</u> |
|--|--|
| International Agricultural Institutes | Greater focus on extension aspects Get African ones working effectively Rotate US scientists through them Use as 'mother' institutes for national ones |
| Host country Research Institutes | Consolidate into a manageable number Give clearer objectives Add FSR and feasibility testing units Improve esprit-des-corps |
| Agriculture information packaging unit | Combine with subject specialists for T & V Establish one per country, recognize as skilled service needing resources |
| Agriculture policy planning unit | Make sure it exists Get best people appointed, use them to monitor sector, spot bottlenecks, set goals |
| Mainline Ministry of Agriculture | Review staff incentives to encourage change Institute performance management Improve budgeting system Institute staff retraining on continuous basis Create T & V support institutions Implement T & V for extension system |
| Linkage to field units | Improve communication vital (radiocall, CB, etc.) Structured upwards communication Open up to commercial participation on inputs Improved incentives for field postings |
| District-level agricultural offices | Allow them to deal directly with research Implement middle-level agricultural management Structural reorganization of tasks into three domains: i) information, ii) inputs & economics, and, iii) training & groupwork |
| Linkage to field agents | Insure overlap of reporting Fewer agents but more transport/equipment Realistic supervisory spans Use monthly salary trips for T & V training Promotions based on field results |
| Contact Agents | Explore possibilities for part-time, volunteers Backstop with national media campaigns Retrain on regular basis to upgrade Make sure has realistic assignment |
| Contact agents to farmers | Combine individual/groupwork Develop basis for selecting contact farmers Insure technology is relevant to farmers Make agents downwardly accountable Research system to have direct access Tap existing co-operatives, voluntary agencies |

| <u>Trend</u> | <u>Proximate causation</u> | <u>Aggregate/long-term effects</u> |
|---|--|---|
| Subsidized food prices | buffer from rampant inflation appease urban poor give salariat benefits stabilize urban-centered political support increase visible benefits | generates cost-price squeeze for farmers & agencies limits rural incomes & therefore national demand encourages parallel markets necessitates input subsidies accentuates dualism |
| Growth of nonformal economy | response to scarcities circumvent import controls avoid parastatal charges avoid payment of taxes retain incomes at gate meet unmet external demands across borders | administrative corruption service costs go unpaid capture of benefits by the powerful or well placed destruction of regime's legitimacy & morality collapse of processing accentuates personalismo |
| Inappropriate industrialization | assumption of economies of scale reaction to perceived inefficiency of labor hope of capturing external markets desire to be "modern" | high dependency on FE for parts, feedstocks, staff high down-time waiting for repairs, spare parts high unit costs of operation inability to compete externally creation of protected markets substantial overcapacity |
| Incorporation of overoptimistic targets | desire to seem heroic political pressure to get task done in one move attempt to meet donor's C/B or IRR targets donor's attempt to disburse funds attractiveness of big projects/programs | creation of surplus processing capacity delinquency on loan repayments high unit costs of operation staff become accustomed to lax accounting & management unrealistic demands placed on extension service, possible resort to coercion encourages fictitious reporting |
| Bureaucratization of rural services | increases control over the rural sector desire to introduce "modern management" copying of DC large-scale institutions get own ministry agents in place within districts increase employment | displaces existing part-time and self-financed services introduces staffing costs beyond capacity of localities alienates local communities substitutes formal leadership for organically responsive leaders within communities duplicates functions & agencies overstrains recurrent budget |
| Reliance on external loan financing | evades short-run FE shortage provides equipment for staff releases present transport for other agencies Availability of soft loan financing | removes pressure to make earlier projects pay-off removes need to develop local expertise allows all funds into staffing removes need to maintain |
| Capital-intensive militarization | availability of soft credit inter-service rivalries worry about neighbours high productivity of new military technologies | diversion of scarce FE creation of military bureaucracy temptation to internal coercion internal instability increased dualism |

APPENDIX I

TREND INTER-CONNECTIVITIES

| <u>Trend</u> | <u>Proximate causation</u> | <u>Aggregate/long-term effects</u> |
|--|---|---|
| Establishment of parastatals | desired structural reform increased coordination 'commercial' objectives in operation of public corp. escape civil service inefficiencies spread locational benefits gain donor financing | loss of best ministry staff bureaucratization of services higher unit costs of operation depressed product prices apparent manpower shortages diversion of professional staff into administration |
| Overinvestment in education/training institutions | apparent shortages of professional/technical staff desire by each ministry to control own training desire by each region for its own higher education desire by families to have more ed. opportunities association of education with modernity need to process output from lower levels | apparent shortages of teachers and good administrators financial crises re: operating and equipment costs demand by students for jobs rivalries between institutes |
| Politicization of administrative/technical functions | desire to respond to client demands directly more equitable distribution of benefits control location of services & benefits force coordination between functions make bureaucrats more responsive curb waste/luxury spending externalize costs | destruction of staff morale encourages "showcase" projects removes pressure to solve problems at their source allocates resources by political power, not need encourages building of over-capacity increases unreliability of specialized functions protects incompetent staff breaks line-of-command rewards <u>loyalty</u> not results |
| Personalismo | external pressures to make staff directly responsible compensatory tactic for the unreliability of others response to scheduling uncertainties response to low quality of junior staff/skills reliance on personal knowledge of staff capabilities | makes personal intervention necessary to get action greatly increases energy input required reinforces 'old boy' ties between members of elite accentuates vertical polarization along patron/client lines accentuates nonformal initiatives opens door to corruption |

APPENDIX II

Select References on Transfer of Technology

- Agyemang, James N. (1978) "A Study to Determine the Extent and Means by Which Adult Farmers in Ghana could be Involved in the Conduct of Agricultural Extension Education Programs," Ed.D. thesis, Oklahoma State Univ.
- Ali, Syed Hashim (1981) "Practical Experience in Implementing the Training and Visit Extension System in Large Command Areas in India," Agric. Admin. Network Papers No. 6. London: Overseas Development Institute, 12 pp.
- Anim, Robert K. (1978) "Agricultural Activities and the Role of Extension in the Adoption of New Farming Methods in Kusasi Area of Ghana," Ph.D. thesis, Ohio State Univ., 183 pp.
- Anthony, Kenneth R. et al. (1979) Agricultural Change in Tropical Africa. Ithaca, N.Y.: Cornell Univ. Press, 326 pp.--a synthesis of 7 studies of African farming systems done in 1967-68 in Ghana, Nigeria, Uganda, Kenya, Tanzania, and Zambia by Anthony and Uchendu. Draws also upon other Stanford Food Research Institute studies in East & West Africa, essential.
- Anthony, Kenneth R. M. et al. (1979) "Agricultural Extension Services," pp. 223-246. In, Agricultural Change in Tropical Africa. Ithaca: Cornell Univ. Press.
- Arndt, Thomas M., Dalrymple, D. & Ruttan, V. (eds.) (1977) Resource Allocation and Productivity in National and International Agricultural Research. Minneapolis: Univ. of Minnesota Press, 617 pp.--still the definitive work on its topic, contains several chapters by Crawford, Brady, Hanson, Wortman, Swanson and others on international agricultural research.
- Arnon, I. (1981) Modernization of Agriculture in Developing Countries. New York: John Wiley, 565 pp.--valuable review of technical literature by one of Israel's foremost research scientists.
- Ascroft, Joseph et al. (1973) Extension and the Forgotten Farmer. IDS Bulletin No. 37. Nairobi: Institute of Development Studies, Univ. of Nairobi.
- Asian Productivity Organization (1975) Agricultural Extension Service in Selected Asian Countries. Tokyo: Asian Productivity Organization, 137 pp.--Part II includes country reports on extension structure in 10 Asian nations.
- Austin, James E. (1981) Nutrition Programs in the Third World. Cambridge, Mass.: Oelgeschlager, Gunn & Hain, 457 pp.--wide selection of cases.
- Axinn, George H. & Thorat, S. (1972) Modernizing World Agriculture: A Comparative Study of Agricultural Extension Education Systems. New York: Praeger, 217 pp.--case studies of 12 national systems, 6 in LDCs (India, Taiwan, Brazil, Egypt, Pakistan, & Nigeria). Badly in need of updating.
- Barnett, T. (1977) The Gezira Scheme: An Illusion of Development. London: Frank Cass.
- Bates, Robert (1981) Markets and States in Tropical Africa. Berkeley: Univ. of California Press.
- Bates, Robert & Lofchie, Michael F. (eds.) (1980) Agricultural Development in Africa: Issues of Public Policy. New York: Praeger.

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- Benor, Daniel & Harrison, James (1977) Agricultural Extension, the Training and Visit System. Washington, D.C.: The World Bank, .. pp.--basic introductory source to the T & V system by its originators.
- Bernard, Frank E. & Thom, Derrick J. (1981) "Population Pressure and Human Carrying Capacity in Selected Locations of Machakos and Kitui Districts," The Journal of Developing Areas, Vol. 15 (April), pp. 381-406.
- Berry, R.A. & Cline, W.R. (1979) Agrarian Structure and Productivity in Developing Countries. Baltimore: Johns Hopkins Univ. Press.
- Bhatt, V.V. (1980) "On Technology Policy and Its Institutional Frame," pp. 71-91. In, Development Perspectives: Problem, Strategy and Policies. Oxford: Pergamon Press.
- Biggs, Stephen D. (1981) "Institutions and Decision-Making in Agricultural Research," Agric. Admin. Network Discussion Paper 5. London: Overseas Development Institute, 22 pp.
- Binswanger, Hans P., Ruttan, Vernon et al. (1978) Induced Innovation. Technology, Institutions, and Development. Baltimore: Johns Hopkins Univ. Press.
- Brady, Nyle C. (1977) "The International Rice Research Institute (IRRI) Outreach Program," pp. 295-305. In, Arndt, Thomas M. et al. (eds.) Resource Allocation and Productivity in National and International Agricultural Research. Minneapolis: Univ. of Minnesota Press.
- Brown, Dorris D. (1971) Agricultural Development in India's Districts. Cambridge, Mass.: Harvard Univ. Press, 169 pp.--case study of India's IADPs.
- Bryant, Coralie & White, Louise G. (1982) Managing Development in the Third World. Boulder, Colorado: Westview Press, 322 pp.--good text on development admin.
- Caiden, Naomi & Wildavsky, A. (1980) Planning and Budgeting in Poor Countries. New Brunswick, N.J.: Transaction Books (1974 ed., John Wiley)--still the best source available on LDC budgeting problems. Required reading.
- Cernea, Michael (1981) "Sociological Dimensions of Extension Organization: The Introduction of the T & V System in India," pp. 221-236. In, Crouch, Bruce & Chamala, Shankariah (eds.) Extension Education and Rural Development. Vol. 2, International Experience in Strategies for Planned Change. Chichester, England: John Wiley.
- Cernea, Michael M. & Tepping, Benjamin (1977) A System for Monitoring and Evaluating Agricultural Extension Projects. World Bank Staff Working Paper No. 272. Washington, D.C.: The World Bank, 115 pp.--a key paper containing much detail on the T & V system as it was adopted in India.
- Chattopadhyay, Boudhayan (1977) Water, Cereals and Economic Growth in South & East Asia in the Fifties & Sixties. New Delhi: People's Publishing House, 389 p --in pp. 57-87 argues "Supply of Water: the Limiting Leading Input."
- Cheema, G. Shabbir & Rondinelli, D.A. (eds.) (1983) Decentralization and Development. Policy Implementation in Developing Countries. Beverly Hills, Cal.: Sage Publications.
- Cohen, John M. (1974) "Rural Change in Ethiopia: The Chilalo Agricultural Development Unit," Economic Development and Cultural Change, vol. 22, pp. 580-614.

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- Cohen, John M. (1975) "Effects of Green Revolution Strategies on Tenants and Small-Scale Landowners in the Chilalo Region of Ethiopia," Journal of Developing Areas, vol. 9, no. 3, pp. 335-58.
- Crawford, J.G. (1977) "Development of the International Agricultural Research System," pp. 281-294. In, Arndt, Thomas et al. (eds.) Resource Allocation and Productivity in National and International Agricultural Research. Minneapolis: Univ. of Minnesota Press.
- Critchfield, Richard (1963) Villages. Garden City, N.Y.: Anchor Press/Doubleday, 388 pp.--pp. 110-142 describe the "green revolution" and its impact on two north Punjab villages.
- Crouch, Bruce & Chamala, Shankariah (eds.) (1981) Extension Education and Rural Development. (2 vols.) Chichester, England: John Wiley.
- Dahlberg, Kenneth (1979) Beyond the Green Revolution. New York: Plenum Press, 256 pp.
- Dalrymple, Dana G. (1975) "Measuring the Green Revolution: The Impact of Research on Wheat and Rice Production." Foreign Agricultural Economic Report No. 106. Washington, D.C.: Economic Research Service, USDA for US Agency for International Development.
- Dasgupta, Biplab (1977) Arrarian Change and the New Technology in India. Geneva: United Nations Research Institute for Social Development, 405 pp.--detailed assessment of the HYV programs in India, based on 7 case studies of wheat and/or rice adoption and inc. a wealth of statistical information. Recommended.
- De Wilde, John C. (1967) "Agricultural Extension, Training and Education," pp. 157-197. In, Experience with Agricultural Development in Tropical Africa. Vol. 1, The Synthesis. Baltimore: Johns Hopkins Press for IBRD.
- Dore, Ronald (1976) The Diploma Disease. Education, Qualification and Development. London: George, Allen & Unwin.
- Economic Commission For Africa (1971) A Comparative Analysis of Agricultural Extension Service of Eight East African Countries--with Suggested Guidelines for Improvement. Addis Ababa: ECA/FAO Joint Agriculture Division.
- Eder, James F. (1982) Who Shall Succeed? Agricultural Development and Social Inequality on a Philippine Frontier. Cambridge: Cambridge Univ. Press, 264 pp.--excellent micro study showing how inequality starts and persists.
- Eicher, Carl (1982) "Facing Up to Africa's Food Crisis," Foreign Affairs, vol. 61, no. 1 (Fall), pp. 151-174.--reviews economic origins of current food crisis.
- Ekpere, Johnson A. (1973) "A Comparative Study of Job Performance Under Two Approaches to Agricultural Extension Organization in the Midwestern State of Nigeria," Ph.D. thesis, Univ. of Wisconsin, 252 pp.
- Erozer, Savas (1978) "Planning and Development of Extension Training in Rural Development at the Bukura Institute of Agriculture, Kenya," Ed.D. thesis, Harvard Univ., 180 pp.

- Farmer, E.H. (ed.) (1977) Green Revolution? Technology and Change in Rice-Growing Areas of Tamil Nadu and Sri Lanka. Boulder, Colo.: Westview Press.
- Food and Agriculture Organization (1970) Report of the First Session of the FAO Regional Commission on Agricultural Extension for Asia and the Far East. Rome: FAO, 182 pp.
- Freeman, David M., Azadi, H. & Lowdermilk, M. (1982) "Power Distribution and Adoption of Agricultural Innovations: A Structural Analysis of Villages in Pakistan," Rural Sociology, vol. 47, no. 1 (Spring), pp. 68-80.
- Franke, Richard W. & Chasin, B. (1980) Seeds of Famine: Ecological Destruction and the Development Dilemma in the West Africa Sahel. Monclair, N.J.: Allanheld, Osmun & Co.--argues from historical and recent data that the shift to high risk arable farming rather than pastoral misuse underlies the Sahel disaster.
- Gable, Richard W. & Springer, J.F. (1979) "Administrative Implications of Development Policy: A Comparative Analysis of Agricultural Programs in Asia," Economic Development and Cultural Change, vol. 27, no. 4, pp. 687-703.
- Gaitskell, Arthur (1959) Gezira. London: Faber & Faber.
- Gall, Pirie M. (1982) Range Management and Livestock Development in the Sahel. Washington, D.C.: Chemonics, 85 pp.
- Gathee, J.W. (1982) "Farming Systems Economics: Fitting Research to Farmers' Conditions," pp. 136-40, In, Keswani, C.L. & Ndunguru, B.J. (eds.) Intercropping. Proceedings of the 2nd. Symposium on Intercropping in Semi-Arid Areas held at Morogoro, Tanzania (4-7 Aug. 1980). Ottawa: International Development Research Centre (DRC-186e).
- Ghai, Dharam et al. (eds.) (1979) Agrarian Systems and Rural Development. New York: Holmes & Meier, 375 pp.--a selection of country studies from the World Employment Program inc. South Korea, India, Bangladesh, Egypt, Guyana, Tanzania, China, Cuba, and Soviet Central Asia.
- Goering, T. James (1979) Tropical Root Crops and Rural Development. World Bank Staff Working Paper No. 324. Washington, D.C.: The World Bank, 85 pp.
- Goodman, Louis J. and Love, Ralph (1980) Project Planning and Management: An Integrated Approach. Oxford: Pergamon Press, 282 pp.
- Could, David J. (1980) Bureaucratic Corruption and Underdevelopment in the Third World. The Case of Zaire. New York: Pergamon Press, 181 pp.
- Goulet, Denis (1977) The Uncertain Promise. Value Conflicts in Technology Transfer. Washington, D.C.: Overseas Development Council, 318 pp.
- Greenwood, Davydd J. (1976) Unrewarding Wealth. The Commercialization and Collapse of Agriculture in a Spanish Basque Town. Cambridge: Cambridge Univ. Press, 223 pp.--a crucial study in economic anthro. which showed how despite higher profits because of different perceptions between generations youths left farming
- Grindle, Merilee (ed.) (1980) Politics and Policy Implementation in the Third World. Princeton, N.Y.: Princeton Univ. Press.

- Grutzner, Gunter (ed.) (1972) Extension and Other Services Supporting the Small Farmer in Asia. Berlin: German Foundation for International Development, 362 pp.
- Guttman, Joel M. (1981) "The Political Economy of Agricultural Extension Services in India," pp. 183-202. In, Russel, C.S. and Nicholson, N.K. (eds.) Public Choice & Rural Development. Washington, D.C.: Resources for the Future.
- Harrison, R. (1969) "Work and Motivation: A Study of Village-Level Agricultural Extension Workers in the Western State of Nigeria." Ibadan: Nigerian Institute of Social and Economic Research. . .
- Hayami, Yujiro & Kikuchi, Masao (1981) Asian Village Economy at the Crossroads. Tokyo: Univ. of Tokyo Press/Baltimore: Johns Hopkins Univ. Press, 275 pp.--puts HYVs in context of village institutional change, based on case studies in Philippines and Indonesia, required reading.
- Heginbotham, Stanley J. (1975) Cultures in Conflict: The Four Faces of Indian Bureaucracy. New York: Columbia Univ. Press.
- Hewitt de Alcantara, Cynthia (1976) Modernizing Mexican Agriculture: Socioeconomic Implications of Technological Change 1940-1970. Geneva: United Nations Research Institute for Social Development, 348 pp.--includes full case study of the subsidization and spread of HYV wheats in Northern Mexico, pp. 139-180.
- Heyer, Judith, Roberts, P. & Williams, G. (eds.) (1981) Rural Development in Tropical Africa. New York: St. Martin's Press.
- Howell, John (1978) "What's Wrong with Managers?" CDI Review, no. 1, pp. 53-69.
- Howell, John (1982) "Managing Agricultural Extension: The T and V System in Practice," Agric. Admin. Network, Discussion Paper 8. London: Overseas Development Institute, 17 pp.
- Ingle, Marcus D. (1979) Implementing Development Programs: A State-of-the-Art Review. Washington, D.C.: Agency for International Development, 131 pp. --useful overview, inc. select biblio. on implementation (pp. 111-131).
- Jacobson, David (1973) Itinerant Townsmen: Friendship and Social Order in Urban Uganda. Menlo Park, Cal.: Cummings Pub. Co., 150 pp.
- Jedlicka, Allen (1977) Organization for Rural Development: Risk Taking and Appropriate Technology. New York: Praeger.
- Jiggins, Janice et al. (1977) Extension, Planning, and the Poor. Agric. Admin. Unit, Occ. Paper 2. London: Overseas Development Institute, 57 pp.
- Johnston, Bruce F. & Clark, William C. (1982) Redesigning Rural Development: A Strategic Perspective. Baltimore: John Hopkins Univ. Press.
- Kamarck, Andrew M. (1976) The Tropics and Economic Development. Baltimore: Johns Hopkins Univ. Press, 113 pp.--makes the case re: severity of environment.
- Kiggundu, M., Jorgensen, J. & Hafsi, T. (1983) "Administrative Theory and Practice in Developing Countries: A Synthesis," Administrative Science Quarterly, vol. 28, pp. 66-84.--useful review of conclusions from 94 articles in field.

- Killick, Tony (1978) Development Economics in Action. A Study of Economic Policies in Ghana. London: Heinemann, 392 pp.--a classic account of what went wrong.
- King, Roger (1981) "Cooperative Policy and Village Development in Northern Nigeria, pp. 259-280. In, Heyer, J. et al. (eds.) Rural Development in Tropical Africa. New York: St. Martin's Press.
- Kline, C.K. et al. (1969) Agricultural Mechanization in Equatorial Africa. East Lansing: Institute of International Agriculture, Michigan State University.--a team review of this topic throughout Africa. Recommended.
- Koppel, Bruce & Beal, George M. (1982) "Graduate Education for International Development: A First Report on a Study of American Rural Sociology," The Rural Sociologist, vol. 2, pp. 346-355.
- Koppel, Bruce & Beal, George (1983) "Graduate Education for International Development: A Second Report on a Study of American Rural Sociology," The Rural Sociologist, vol. 3, pp. 2-10.
- Korten, David C. & Alfonso, Felipe B. (eds.) (1981) Bureaucracy and the Poor: Closing the Gap. Singapore: McGraw-Hill.
- Kulp, Earl M. (1977) Designing and Managing Basic Agricultural Programs. Bloomington, Indiana: International Development Institute, Indiana Univ., 280 pp.--presents a planning methodology adapted for use in African districts.
- Lamb, Geoffrey & Muller, Linda (1982) Control, Accountability, and Incentives in a Successful Development Institution. The Kenya Tea Development Authority. World Bank Staff Working Papers, No. 550. Washington, D.C.: The World Bank, 71 pp.
- Leakey, C.L.A. & Willis, J. (eds.) (1977) Food Crops of the Lowland Tropics. New York: Oxford Univ. Press.--oriented primarily to Nigeria, Ghana and Ivory Coast.
- Leonard, David (1977) Reaching the Peasant Farmer. Organization Theory and Practice in Kenya. Chicago: Univ. of Chicago Press, 297 pp.--this study of the extension service in western Kenya remains the one against which all others are compared. Pp. 214-217 give general recommendations.
- Levi, John (1974) "African Agriculture Misunderstood: Policy in Sierra Leone," Food Research Institute Studies, vol. 13, no. 3, pp. 239-62.
- Loehr, William & Powelson, J.P. (1981) "Technology," pp. 167-191. In, The Economics of Development and Distribution. New York: Harcourt Brace Jovanovich.
- McInerney, John P. (1978) The Technology of Rural Development. World Bank Staff Working Paper No. 295. Washington, D.C.: The World Bank, 47 pp.
- Maunder, Addison (1973) Agricultural Extension: A Reference Manual. Rome: FAO.
- Moris, Jon R. (1972) "Administrative Authority and the Problem of Effective Agricultural Administration in East Africa," The African Review, vol. 2, no. 1 (June), pp. 105-146.

- Moris, Jon R. (1977) "The Transferability of Western Management Concepts and Programs, an East African Perspective," pp. 73-83. In, Stifel, Laurence D., Coleman, J. & Black, J. (eds.) Education and Training for Public Sector Management in Developing Countries. New York: Rockefeller Foundation.
- Moris, Jon R. (1981) Managing Induced Rural Development. Bloomington, Indiana: International Development Institute, Indiana University.
- Mosher, Arthur T. (1978) An Introduction to Agricultural Extension. New York: Agricultural Development Council, 114 pp.
- Myren, Delbert T. (1969) "The Rockefeller Foundation Program in Corn and Wheat in Mexico," pp. 438-452. In, Wharton, Clifton R. (ed.) Subsistence Agriculture and Economic Development. Chicago: Aldine Pub. Co.
- Nekby, Bengt (1971) CADU: An Ethiopian Experiment in Developing Peasant Farming. Stockholm: Prisma Publishers.
- Nelson, Richard (1974) "Less Developed Countries--Technology Transfer and Adaptation: The Role of the Indigenous Science Community," Economic Development and Cultural Change, vol. 23, no. 1, pp. 61-77.
- Norman, D.W. (1976) "The Organisational Consequences of Social and Economic Constraints and Policies in Dry-Land Areas," pp. 168-186. In, Hunter, Guy, Bunting, A. & Bottrall, A. (eds.) Policy and Practice in Rural Development. London: Croom Helm for ODI, 520 pp.
- Ollawa, Patrick (1978) "Rural Development in Zambia: A Review of Performance and Future Prospects," pp. 71-100. In, Damachi, U. & Diejomaoh, V. (eds.) Human Resources and African Development. New York: Praeger.
- Overseas Development Institute (1979) Institutions, Management, and Agricultural Development. Agric. Admin. Unit, Occ. Paper 3. London: ODI, 61 pp.
- Owen, D.F. (1973) Man in Tropical Africa, the Environmental Predicament. New York: Oxford Univ. Press.
- Palmer, Ingrid (1976) The New Rice in Asia: Conclusions from Four Country Studies. Geneva: United Nations Research Institute for Social Development, 143 pp.
- Paul, Samuel (1982) Managing Development Programs: The Lessons of Success. Boulder, Colorado: Westview Press, 247 pp.--compares 6 dev. programs.
- Pearse, Andrew (1978) "Technology and Peasant Production: Reflections on a Global Study," pp. 183-211. In, Newby, Howard (ed.) International Perspectives in Rural Sociology. Chichester, England: John Wiley.
- Pearse, Andrew (1980) Seeds of Plenty, Seeds of Want. Social and Economic Implications of the Green Revolution. Oxford: Clarendon Press for UNRISD, 262 pp.--an overview based on UNRISD studies of HYVs' impact.

- Peirce, William Spangar (1981) Bureaucratic Failure and Public Expenditure. New York: Academic Press, 319 pp.--gives hypotheses for low DC agency output.
- Peters, Thomas J. (1978) "Symbols, Patterns, and Setting: An Optimistic Case for Getting Things Done," Organizational Dynamics, vol. 7, no. 2, pp. 2-23.
- Pinstrup-Andersen, Per & Franklin, D. (1977) "A Systems Approach to Agricultural Research Resource Allocation in Developing Countries," pp. 416-435. In, Arndt, Thomas et al. (eds.) Resource Allocation and Productivity in National and International Agricultural Research. Minneapolis: Univ. of Minnesota Press.
- Porter, Philip W. (1979) Food and Development in the Semi-Arid Zone of East Africa. Foreign & Comparative Studies/African Studies 32. Syracuse, N.Y.: Maxwell School of Citizenship and Public Affairs, Syracuse Univ., 107 pp.
- Price, Robert M. (1975) Society and Bureaucracy in Contemporary Ghana. Berkeley: Univ. of California Press, 261 pp.
- Quick, Stephen A. (1980) "The Paradox of Popularity: 'Ideological' Program Implementation in Zambia," pp. 40-63. In, Grindle, Merilee (ed.) Politics and Policy Implementation in the Third World. Princeton, N.Y.: Princeton Univ. Press
- Radian, Alex (1980) Resource Mobilization in Poor Countries. Implementing Tax Policies. New Brunswick, N.J.: Transaction Books, 266 pp.--recommended.
- Read, Hadley (1974) Partners With India: Building Agricultural Universities. Urbana: Univ. of Illinois, 159 pp.--inc. details on the 9 USAID contracts to establish Indian agricultural universities (1952-72).
- Rice, Edward (1974) Extension in the Andes. Cambridge, Mass.: MIT Press.
- Rondinelli, Dennis A. (ed.) (1977) Planning Development Projects. Stroudsburg, Penn.: Dowden, Hutchinson & Ross.
- Rosenberg, Nathan (1982) Inside the Black Box: Technology and Economics. Cambridge: Cambridge Univ. Press, 304 pp.
- Rudra, Ashok (1979) "Organisation of Agriculture for Rural Development: The Indian Case," pp. 72-112. In, Ghai, Dharam et al. (eds.) Agrarian Systems and Rural Development. New York: Holmes & Meier.
- Ruthenberg, Hans (1977) "The Adaptation of Agricultural Production Services to Changing Circumstances: Some Considerations Based on Experience with Projects in Tropical Africa," Agricultural Administration, vol. 4, pp. 131-148.
- Ruttan, Vernon (1982) Agricultural Research Policy. Minneapolis: Univ. of Minnesota Press, 370 pp.--see esp. chap. 5, "The International Agricultural Research System."
- Scobie, Grant M. (1979) Investment in International Agricultural Research: Some Economic Dimensions. World Bank Staff Working Paper No. 361. Washington, D.C.: The World Bank, 96 pp.--inc. biblio. (pp. 53-98).

- Scott, Roy V. (1970) The Reluctant Farmer. The Rise of Agricultural Extension to 1914. Urbana, Ill.: Univ. of Illinois Press, 362 pp.
- Shand, R.T. (ed.) (1973) Technical Change in Asian Agriculture. Canberra: Australian National Univ. Press, 319 pp.--contains case studies of HYVs in various Asian countries inc. Pakistan, Philippines, Java, Thailand, Burma, India, Taiwan and Japan.
- Shenoi, P.V. (1975) Agricultural Development in India: A New Strategy in Management. Delhi: Vikas Pub. House, 373 pp.
- Smith, William E., Lethem, Francis & Thoolen, B. (1980) The Design of Organizations for Rural Development Projects--A Progress Report. World Bank Staff Working Paper No. 375. Washington, D.C.: The World Bank, 48 pp.
- Sprague, G.F. (1970) "Factors Affecting the Adoption of Hybrid Maize in the United States and Kenya," pp. 87-95. In, Bunting, A.H. (ed.) Change in Agriculture. London: Gerald Duckworth.
- Stakman, E.C., Bradfield, R. & Mangelsdorf (1967) Campaigns Against Hunger. Cambridge, Mass.: Harvard Univ. Press, 328 pp.--insiders' account of the early years in the Rockefeller HYV programs.
- Stavis, B. (1978) "Agricultural Research and Extension Services in China," World Development, Vol. 6, pp. 631-645.
- Stavis, B. (1979) Agricultural Extension for Small Farmers. MSU Rural Development Working Paper No. 3. East Lansing, Mich.: Dept. of Agric. Economics, Michigan State University.
- Stier, Harald (1974) "Extension Service, Education and Agricultural Development," pp. 450-466. In, Islam, Nurul (ed.) Agricultural Policy in Developing Countries New York: John Wiley.
- Stommes, Eileen (1978) "Village Complexity and the Delivery of Agricultural Extension Services: Lessons from El Salvador," Agricultural Systems, vol. 3, no. 4, pp. 265-280.
- Streeter, Carroll P. (1969) A Partnership to Improve Food Production in India. New York: Rockefeller Foundation, 137 pp.--though a publicity document, this report contains a great deal of information on the RF's early Indian programs.
- Sussman, Gerald E. (1980) "The Pilot Project and the Choice of an Implementing Strategy: Community Development in India," pp. 103-122. In, Grindle, Merilee (ed.) Politics and Policy Implementation in the Third World. Princeton, N.J.: Princeton Univ. Press.
- Swanson, Burton E. (1974) "Training Agricultural Research and Extension Workers from Less Developed Countries." Ph.D. dissertation, Univ. of Wisconsin.
- Swanson, Burton E. (1976) Regional Agricultural Production Programs: Training and Design Strategies. PASITAM Design Study. Bloomington, Indiana: International Development Institute, Indiana University, 26 pp.
- Swanson, Burton E. (1975) Organizing Agricultural Technology Transfer. The Effects of Alternative Arrangements. Bloomington, Indiana: International Development Institute, Indiana University, 64 pp.--useful review of wheat and rice programs at CIMMYT and IRRI. Pp. 1-31 provides details on wheat technology, pp. 39-61 the CIMMYT and IRRI training programs. Recommended.

- Taylor, Lee, Reader, W. & Mangalam, J. (1970) Internationalizing Rural Sociology. Cornell International Agric. Development Bulletin 16. Ithaca, N.Y.: Cornell University, 90 pp.
- Todaro, Michael P. (1981) Economic Development in the Third World. New York: Longman.
- US Dept. of Agriculture (1976) Analyzing Impacts of Extension Programs. Washington, D.C.: USDA.
- Van Donge, Jan Kess (1982) "Politicians, Bureaucrats and Farmers: A Zambian Case Study," The J. of Development Studies, vol. 19, no. 1, pp. 88-107.
- Weiner, Myron (1962) The Politics of Scarcity. Chicago: Univ. of Chicago Press.
- Weiss, Wayne, Waterston, Albert & Wilson, John (1977) "The Design of Agricultural and Rural Development Projects," pp. 95-139. In, Rondinelli, Dennis (ed.) Planning Development Projects. Stroudsburg, Penn.: Dowden, Hutchinson & Ross.
- White, Gilbert F. (ed.) (1974) Natural Hazards. Local, National, Global. New York: Oxford Univ. Press, 288 pp.
- Wisner, Benjamin & Mbithi, Philip (1974) "Drought in Eastern Kenya: Nutritional Status and Farmer Activity," pp. 87-97. In, White, Gilbert (ed.) Natural Hazards. New York: Oxford Univ. Press.
- Wong, John (ed.) (1979) Group Farming in Asia. Singapore: Singapore Univ. Press, 296 pp.—21 case studies drawn from farming systems throughout Asia.
- Wood, G.P. & Mosher, A.T. (eds.) (1980) Readings in Agricultural Administration. New York: Agricultural Development Council.
- World Bank (1981) Accelerated Development in Sub-Saharan Africa. An Agenda for Action. Washington, D.C.: The World Bank, 198 pp.—the most readily accessible source of comparative African statistics, this report sees Africa through economists' spectacles. A useful starting reference.
- Wortman, Sterling & Cummings, Ralph (1978) To Feed This World. Baltimore: Johns Hopkins Univ. Press, 440 pp.—basic text, chap. 7 gives review of HYV status crop by crop, chap. 8 capsule histories of country campaigns, chap. 12, "research with payoff" esp. relevant to transfer of technology.
- Young, Crawford, Sherman, N. & Rose, T. (1981) Cooperatives & Development. Agricultural Politics in Ghana and Uganda. Madison, Wis.: Univ. of Wisconsin Press.

- Taylor, Lee, Reader, W. & Mangalam, J. (1970) Internationalizing Rural Sociology. Cornell International Agric. Development Bulletin 16. Ithaca, N.Y.: Cornell University, 90 pp.
- Todaro, Michael P. (1981) Economic Development in the Third World. New York: Longman.
- US Dept. of Agriculture (1976) Analyzing Impacts of Extension Programs. Washington, D.C.: USDA.
- Van Donge, Jan Kess (1982) "Politicians, Bureaucrats and Farmers: A Zambian Case Study," The J. of Development Studies, vol. 19, no. 1, pp. 88-107.
- Weiner, Myron (1962) The Politics of Scarcity. Chicago: Univ. of Chicago Press.
- Weiss, Wayne, Waterston, Albert & Wilson, John (1977) "The Design of Agricultural and Rural Development Projects," pp. 95-139. In, Rondinelli, Dennis (ed.) Planning Development Projects. Stroudsburg, Penn.: Dowden, Hutchinson & Ross.
- White, Gilbert F. (ed.) (1974) Natural Hazards. Local, National, Global. New York: Oxford Univ. Press, 288 pp.
- Wisner, Benjamin & Mbithi, Philip (1974) "Drought in Eastern Kenya: Nutritional Status and Farmer Activity," pp. 87-97. In, White, Gilbert (ed.) Natural Hazards. New York: Oxford Univ. Press.
- Wong, John (ed.) (1979) Group Farming in Asia. Singapore: Singapore Univ. Press, 296 pp.--21 case studies drawn from farming systems throughout Asia.
- Wood, G.P. & Mosher, A.T. (eds.) (1980) Readings in Agricultural Administration. New York: Agricultural Development Council.
- World Bank (1981) Accelerated Development in Sub-Saharan Africa. An Agenda for Action. Washington, D.C.: The World Bank, 198 pp.--the most readily accessible source of comparative African statistics, this report sees Africa through economists' spectacles. A useful starting reference.
- Wortman, Sterling & Cummings, Ralph (1978) To Feed This World. Baltimore: Johns Hopkins Univ. Press, 440 pp.--basic text, chap. 7 gives review of HYV status crop by crop, chap. 8 capsule histories of country campaigns, chap. 12, "research with payoff" esp. relevant to transfer of technology.
- Young, Crawford, Sherman, N. & Rose, T. (1981) Cooperatives & Development. Agricultural Politics in Ghana and Uganda. Madison, Wis.: Univ. of Wisconsin Press.