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TANZANIA AGRICULTURAL SECTOR MANPOWER STUDY:

The Demand, Supply, Education, and Utilization of Professional and Technical Agricultural Personnel 1979 - 1986

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A Collaborative Effort of:

Government of Tanzania
-Ministry of Agriculture
-Ministry of Manpower Development
West Virginia University
-Office of International Programs
(Contract AID/AFR-C-1067)
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-Mission to Tanzania

EXECUTIVE SUMMARY

Highlights of the Agricultural Manpower Study

1. Manpower Supply and Demand Survey

An agricultural manpower survey of 282 crop and livestock managers was carried out in May and June, 1979. All districts, regions, ministry divisions, research institutes, educational institutions, private firms and parastatals who employ agriculturalists were covered. This survey recorded the filled posts, estimated the manpower needs for 1980-1986, and computed the ideal staffing pattern for professional and technical staff. It represents what professional agriculturalists believe would respond to the needs and opportunities of the sector as perceived by each organization unit. The survey recorded both the educational levels and fields of specialization in which staff are now working, and in which more will be needed.

2. Agricultural Manpower Planning System Improvement

A comprehensive view of the sector's current situation and the manpower goals towards which the sector should move are laid out. Top management in the sector will be able to make more informed decisions with the information now available, and will be able to call for additional cross-tabulations from a computerized file. At decentralized levels, there are computer print-outs displaying each end-user's needs for easy reference. This data base makes it possible for every organization to review, update, prioritize and measure progress in their own manpower plan as situations change in the field. Similarly, the data base permits the centralized coordination of the agricultural sector's needs, and facilitates the compilation of a relevant national agricultural training plan each year based on end-user wishes to the greatest extent possible. The exact specializations in which education should be concentrated at each level are now known with greater accuracy. The proportions of students who should major in each of twenty-one technical specialty groups can now be programmed with a degree of precision not previously possible.

3. Manpower Shortage Situation

The gaps between presently projected supply and demand have been calculated through 1991, taking turnover and attrition factors into consideration. The gaps are large at almost every level and in most specialty fields. The major reasons for the existence of these gaps are:

-- Form IV and Form VI school leavers are and will continue to be in relatively fixed and scarce supply for the next decade, especially those with math and science qualifications;

-- Only very small percentages of these school leavers are allocated to the agricultural training institutions at certificate (3½%), diploma (5½%), and B.Sc. levels (4.7%).

In the next ten years, little can be done to increase the secondary school manpower pools beyond the presently contemplated expansion. Therefore, the major decision issue for national policy makers is whether or not to enlarge the allocations of scarce human resources to the agricultural sector. This matter should be raised by the sector's top management at the highest national level.*

4. Agricultural Manpower Production Guidelines

With regard to manpower production within the agricultural sector, the study recommends:

a.) Certificate Level. Maintain the 3.4% per annum increase in certificate staff production presently projected. Further increases are not justified at this time due to the absence of economically and technically viable recommendation packages for farmers in many areas. (See Manpower Utilization Section.)

b.) Diploma Level. Maintain the 18% average per annum increases in diploma staff production presently projected. This is because diploma level specialization training turns out staff who are more useful on-the-job.

c.) Increase the ratio of Form VI to certificate holder entrants in the diploma

* The study itself cannot scientifically prove that a larger allocation of human resources to the agricultural sector will yield more than allocations to other sectors. The study team believes there are strong indicators that this is likely to be true, especially at higher educational levels. However, the study's terms of reference did not request an analysis of comparative returns, and such data is lacking. As with so many development planning issues, this is more an area for managerial judgement than analytic precision.

programs from the present 30:70 to 50:50. This will enhance the quality and growth potential of diploma outputs; and provide an enlarged pool of candidates for future B.Sc. level training from within the ranks.

d.) Bachelors Level. Raise the presently projected low 4% average per annum increase in B.Sc. outputs by increasing the allocation of Form VI entrants as well as diploma holders to UDSM (Morogoro) and/or overseas institutions. This would help to match the higher financial allocation of development funds to the agricultural sector in recent years with a commensurate rise in human resource allocations. Agricultural development projects require better managers, subject matter specialists, and researchers, while the sector also needs an enlarged pool from which M.Sc. trainees can be found.

e.) Masters Level. Maintain the optimistic projection of 27% average annual increase in M.Sc. outputs. These personnel are urgently needed for expanded research programs to identify viable recommendation packages for farmers; and to handle the senior policy analysis, planning, programming and operations administration functions in the next twenty years.

5. Institutional Development Recommendations

To follow the production guidelines, institutional development recommendations for the MATIs and the UDSM (Morogoro) have been made:

a.) The MATI system should be expanded by a minimum of 25% by 1987, from the present 2,219 to 2,774 student places. A six year lead time is required for project authorization, funding, design and construction phases; and therefore preparatory work will have to begin soon.

b.) The UDSM-Faculty of Agriculture and Veterinary Science's expansion should be considered by a high level working group on educational policy and institutional planning. Questions have arisen over the present low capacity utilization of the B.Sc. program, while many students are at overseas institutions. While 90 to 100 places are available, 1980 intakes totalled only 33 persons. At the same time, at least 35 persons went on overseas B.Sc. (Agriculture) training. It seems likely that inappropriately stringent and outmoded entry qualifications have caused this inefficient situation.

Closely related issues which need to be addressed are: the possibility of

remedial programs for entrants without adequate preparation in the maths and sciences; the advisability of adding another year to the presently overcrowded B.Sc. (Agric.) program to allow proper and adequate learning time (as is done in other fields and countries); curriculum development and teaching methods improvements; the size, scope and balance among M.Sc. and Ph.D. program offerings; and recurrent costs coverage and possible roles of donors. An independent consultant on university agricultural education is recommended to serve as a technical secretariat to facilitate the work of the group.

6. Agricultural Education System Improvements

As the principal UDSM-Faculty of Agriculture and Veterinary Science issues have already been mentioned in the production guidelines, this section will only summarize the major recommendations to do with MATIs.

The agricultural education sub-sector team visited 8 of 12 MATIs, interviewed the institute managers, and administered questionnaires to 167 (our of 388) tutors, and 967 (out of 1800) students. All end-users were asked to rate the quality of preparation of their recently arrived staff from institutes, and what recommendations they would make for improvements in training. In addition, many unstructured interpretive interviews were held with staff, students, administrators, headquarters officials, and end-users.

Two broad aspects of the MATIs were considered in this extensive investigation — their programs, and their internal management. The key programmatic suggestions made in the study are:

a.) To revise the certificate agro-vet syllabus (if a generalist orientation continues to be chosen). This would make the syllabus more narrowly focused on those topics that are most frequently encountered by extension agents, and allow more relevant and effective curriculums to be taught;

b.) To alter the final exam system which presently claims so much scarce staff time and funds in evaluation, that there is insufficient time or energy available to improve educational quality;

c.) To enlarge the time and resources devoted to curriculum development, especially detailed model lesson plans (modules) containing both improved theory and (most

importantly) improved practicals;

d.) To install the new curriculums within the context of teacher training and upgrading efforts, and on-farm outreach programs;

e.) To offer in close coordination with the extension and research services an expanded array of short course training programs as needed (the manpower survey obtained a current list of short courses desired by every end-user, and thus a training plan does exist).

The most crucial internal management recommendations concerned:

f.) The need to consolidate the MATIs so that a minimum size of 320 students is achieved. This is essential to attain minimum levels of institutional efficiency and effectiveness in both administration and program offerings;

g.) The establishment of a recurrent unit cost estimation method that is equitable and systematic. It should probably be done on a per student basis for each level and subject taught on the program side; and then consider special management factors such as distance and local area costs separately.

h.) The procurement of educational facilities and management planning consultant(s) to work with the MATI system managers to structure a detailed expansion plan that takes the aforementioned costing and consolidation matters into full consideration. The resultant plan can lay the basis for funding proposals both domestically and internationally.

In addition to the above, many highly detailed recommendations about technical teaching and administration issues are included in the full text.

7. Manpower Utilization: The Efficiency and Effectiveness of Agricultural Staff

A manpower planning study oftentimes has the unintended side effect of creating a momentum of its own in favor of extensive manpower production. The gaps stand out clearly, and everyone seems to be in favor of closing them. The implicit assumption appears to be that more and better manpower will solve the problems. This is undoubtedly an oversimplification and a partial truth at best.

Many factors other than the quantity and quality of manpower naturally enter into the equation for stimulating agricultural development. This was well recognized by the Ministry of Agriculture in the terms of reference for the study team. They specified an inquiry into the efficiency and effectiveness with which manpower is utilized as a part of the study. They recognized that the mere provision of additional numbers of better trained personnel are probably a necessary but not sufficient condition for advancing agricultural development. It was understood that it would be a waste of the people's money to expensively educate, hire and deploy thousands more staff if they would not have much impact on farmer production and productivity. For these reasons, information was gathered on a number of utilization problems; and an analysis was made to determine if helpful recommendations could be put forth.

It was found that the following technical agricultural and administrative support functions were critical to an understanding of the situation:

Technical Agricultural Functions	Administrative Support Functions
1 - Research Policies and Programs	5 - Organization Structures & Coordination
2 - Planning/Programming Processes	6 - Logistics
3 - Training	7 - Finance
4 - Extension Operations	8 - Personnel

In what follows, an introductory overview of the agricultural development context of utilization problems is given. Then, coverage of the principal findings under each category of agricultural and administrative functions is made.

A. Utilization Overview

Ultimately agricultural development is the result of decisions taken by individual and communal farmers to change their practices. Farmers do not produce more or increase their productivity per acre or labour hour unless they can minimize their costs and risks, and maximize their gains. Their calculations involve the need for capital, labour, markets, prices, credit, timely inputs, and transport, as well as consideration of their

natural resource base of soils, rainfall, pests and disease potential, and even how any changes might affect social and political obligations and relationships.

Many explanations have been put forth to explain why most farmers in the nation have not altered their management decisions (to accord with Government's wishes) about what to produce, how to produce it, how much, when and where. These explanations range all the way from the supposed inadequacies of extension agents to lack of road maintenance and low cost transport facilities, not to mention poor training, insufficient research studies, lack of ministry support, lack of trained planners, insufficient roads, unclear organization structures, and so on and so forth. Depending on the particular area and crop or livestock endeavor, any one or more of these explanations may indeed be accurate. The country is very large, very diverse, and each place has experienced one or more of such shortcomings alone or in combination on a number of occassions.

Those knowledgable about the micro-economic situation in Tanzanian agriculture seem to agree on one point. For most of the country there is an absence of technically feasible and economically viable recommendation packages to communicate to farmers. Even if there were good roads, prices, marketing arrangements, inputs, knowledgable extension personnel, adequate transport for supervisory personnel, proper work programming, and so forth, many farmers would still not change their practices. The absence of opportunities for making a surplus for the smaller farmers appears to be the single most important factor underlying the long term downward trend in agricultural production and productivity. All other shortcomings contribute to this perhaps, but the root cause remains the same. Development planners and agriculturalists have not often been able to put together a set of improved practices, price policies, and supporting services which are technically feasible and economically viable for the farmer.

There have been a number of successful cases in the past involving cash crops, principally. However, the more common case is an example of failure. These are instructive, nonetheless. A classic case in Tanzania, but also in Africa more generally, is a set of cotton planting dates, fertilizer and pesticide applications. Hull, Saylor, Collinson, Kirkby, Keregero, and De Vries have documented the Tanzanian example well.

The needed early planting times for maximum cotton yields interfere with the planting times for essential food crops. To peasant farmers on the subsistence margin, there is no question which crop will receive the most attention. Food security is the highest priority. Fertilizer applications not only cost more money than most farmers would be willing to get into debt for, but fertilizer also has the side effect of enhancing weed growth. Even if fertilizer is free or subsidized, the farmer is courting disaster unless there is adequate family labour to carry out extra weedings. The seemingly "progressive and modern" adoption of an improved practice can not only cause farmers to get into debt over their heads; they might not be able to reap the rewards if their labour availability or cash to hire labour is insufficient. And if they live in a highly unreliable rainfall area (which farmers know best about), they are altogether justified in rejecting the so-called "package." To make things worse, some recommendations have been advocated for areas in which verification trials had never been done, and with predictable results.

The Tanzanian experience is somewhat comparable to the situation in northern Nigeria. There, an analyst compared the standard recommendations for cotton and what they would mean for the average farmer with what the farmer's actual management decisions were under the cash, labour, rainfall and soil types situation he/she faced. A linear programming model with these simple constraints built in for an average sized farm demonstrated that the farmer was fully rational in rejecting the package. Risks were minimized and gains were maximized -- precisely because most farmers were able to shrewdly analyze their own situations better than most.

In the course of this study one DADO was asked which crops were being given emphasis in his district's extension work. He replied that pyrethrum was the most important, but that the farmers were not "cooperating." When asked which crops returned the greatest profits, he indicated that potatoes did; and that most farmers "unfortunately" preferred growing potatoes rather than pyrethrum. When asked which crops he would personally grow if he were a farmer, he responded, "potatoes, of course."

Attention was drawn to his individual common sense, as contrasted with the official

extension campaign. He immediately saw that the farmers were making a very sensible choice, and that the campaign would show the Government in a very poor light. The Government would not appear to have the farmers' best interests at heart, nor would it appear to be even minimally rational. In addition, who would ever listen to extension agents if they gave advice that would make farmers poorer than they could otherwise be? It is understandable then if some extension agents could be viewed by farmers as parasites on the society, rather than as fellow workers in a common struggle.

Many development planners and agriculturalists are unable to perceive the farmer's point of view on these matters. Many professionals tend to see the situation from their own specialty area's perspective. And each tends to think his or her perspective is the critical ingredient in improving a situation.

In covering the range of opinions on explanations for the less than sterling performance of the sector, a variety of observations come to light. It appears true that the extension service does not have adequate numbers and qualities of personnel, that it lacks transport for district and ward supervisors to back up contact agents, that extensionists are weak in communication methods, that proper work planning and control is not followed, that motorcycles and bicycles are needed, that improved coordination at the village level with Party and village council is necessary, that on-the-job training and short courses are required, that better teachers, teaching materials, and methods and facilities should be put in place at MATIs, and so on.

It is often true that district and regional planners with a sense of the village realities are in short supply, that there is a lack of ministry support for regional and district activities, that research institutes do not tie in well with extensionists, that researchers don't always ask the most relevant questions, that researchers don't get out enough to talk with farmers, that parastatals don't coordinate closely enough, that staff transfers at the supervisory level are too frequent, that promotions are few and far between with adverse effects on morale, that there are too few women to work with women cultivators, that some RADOs and DADOs have sometimes been forbidden to communicate directly, and that there is sometimes an inability to distinguish between

policy/administrative issues and technical ones.

It is true that the input, credit, marketing and most other systems do not work well enough for the vast majority of people in rural areas. In addition, political scientists, sociologists, anthropologists, and community developers see poor educational work, insufficient grass roots mobilization, violation of cultural values and norms, ineffective approaches to working with rural peasant communities, and intercultural insensitivity.

It is also true that extension personnel tend to see the problem as an extension, manpower and logistics problem, trainers as a training problem, planners and administrators as financial and organizational problems, and researchers as research problems only. And of course, each view is accurate to a great extent. Each perspective shares a part of the very complicated reality. And each believes that an allocation of more men, money and materials to his or her effort would help to set the situation right. Each group is sincere, well-intentioned, articulate and committed as they grapple with their problems. And many should be complimented for the genuine progress that is made in dealing with such difficult situations.

In any complex endeavor such as agricultural and rural development, the solutions are usually multifaceted, requiring innumerable improvements in many areas over a longer time than most people are willing to admit. It is a human tendency to attack all of them with equal vigor. Unfortunately, the human, financial and managerial resources for dealing with all these difficulties at one time are extremely limited. In the face of this dilemma the practice is still to attack the enemies along a broad front, investing some scarce funds and effort in each aspect of the problem. Because of this, sufficient force is seldom able to be marshalled at any one point to make a break-through. Part of the reason why funds are committed over so many efforts is the natural counter-pressures in bureaucratic organizations. Decision makers at each level want more resources, and wish to support their subordinate personnel to accomplish their goals. They wish to avoid saying "No" to their staffs out of sympathy with their efforts, to avoid discouraging them, and quite frankly to avoid confrontations and

being continuously nagged about things.

In addition, there are the normal and powerful socio-political pressures for continuing investments in each geographic area, which is common to any strong democratic country. The citizenry and their representatives naturally feel that there must be equitable distribution of development efforts.

These altogether understandable pressures result in a number of effects. First, by spreading resources too thinly to make significant breakthroughs in critical areas sooner rather than later.

Second, without the concentration necessary, the number of years to achieve progress is immeasurably lengthened, and people at all levels become impatient and disillusioned.

Third, the thin spread of resources over too many improvement efforts ignores the essential logical sequence in which agricultural development efforts must proceed.

Fourth, the reluctance to concentrate means a wastage of funds and energies. For improvements in one area will not often result in production and productivity unless preceded by essential prerequisites in other areas.

Fifth, dispersal does not allow concentration to help those areas in most desperate need (for example, the dryland crops/livestock areas of medium and low potential where the majority of citizens live).

Sixth, dispersal means wastage of the people's money, in the sense that it does not produce anything for them. They lose respect for what they know is absurd advice and become cynical and disillusioned about the future. Their capacity to mobilize themselves and to be mobilized in larger national efforts becomes less.

In such a situation it is important to work logically towards the solution of the problems defined. Otherwise, additional scarce resources are going to be wasted. Most (but not all) areas suffer from the following:

-- Lack of viable technologies, which implies that more research is needed.

-- Lack of planning skills to determine what should be done, as well as the managerial programming skills to set out which activities will be done at what cost, by whom, when, where, and how.

-- Lack of properly trained and sufficient numbers of agents to carry out the programmatic activities.

-- Lack of adequate supervisory work planning and control of contact agents delivering the services to the public.

The logical sequence of overlapping stages is shown in Exhibit A.

Exhibit A

Logical Sequence for Technical Agricultural Functions Performance

Technical Agricultural Functions	Time---------→
1. Research	(Viable recommendations evolving)
2. Planning/Programming	(To be scheduled for implementation)
3. Training (Pre/IST/OJT)	(By properly prepared agents)
4. Extension	(Carefully concentrated & supervised)

At each of these stages, there must naturally be supportive administrative and organizational activities for coordination, finance, logistics, and personnel.

The situation any particular region, district, ward or village is in, will vary with their own peculiar agricultural problems. Most suffer from all the problems, to a greater or lesser extent as noted earlier. Therefore, it is possible to make some broad suggestions as to the types of policy guidelines and programmatic activities and investments that could respond to the issues raised.

In the following sections, policy and program suggestions are made which should be helpful in making progress. They represent the best judgements available about what will raise the effectiveness and efficiency with which manpower is and can be utilized.

B. Research Policies and Programs

As noted, it was found that the absence of viable technical and economic recommendations is the underlying fundamental fact about the lack of agricultural progress. Therefore, it is recommended that research receive the highest priority for agricultural investment funds by Government. Past investment in research has been declining, and the literature on agricultural development in both more and less developed countries attributes very high returns to research investments.

Equally importnat in larger and accelerated research programs is the improvement in the quality of questions being asked and the methods by which research is conducted. Three essential guidelines are recommended: (1) that research be based on agro-ecological approaches for the major micro-climates identified; (2) that research take a farm centered problem-solving approach for on-farm testing to arrive at recommendations relevant to the small farmers; and (3) that research be collaborative with the farmer and extension staff as full partners. Proper coverage of each major agro-ecological zone will help to achieve equity. Farm centeredness will create research questions based on the farmer's real labour and cash availability constraints, as he faces the physical and biological facts of his particular area.

Unfortunately, much past research has discovered scientific truths that are relevant primarily to larger scale farmers in the higher potential areas with fewer constraints, and is often concerned with cash crops. Finally, much research has taken place without the wholehearted collaboration of farmers who have much relevant knowledge about their own areas. By conducting "action-research and extension" with farmers, its efficiency, the speed of results dissemination and rates of adoption would be enhanced. Properly balanced programs of institute-based, and on-farm research are required; and the socio-economic dimensions of agricultural improvements should receive proper attention along with the technical investigations. A "farming systems" approach to research and agricultural development is called for in the immediate future.

C. Planning and Programming Processes

Planning is the process of identifying what should be done in each district and region; while programming refers to the determination of how it should be done, when, at what cost, requiring which materials and supplies, how many staff, and with who else's cooperation. In both processes, there is a lack of collaboration amongst those individuals and organizations which have the particular expertise needed. To deal with these problems, it is proposed that an Agricultural Planning and Implementation Calender (APIC) based on crop and livestock cycles in each district be worked out, together with the deadlines for contributions to regional and national plans and budgets. Working back from the deadlines, enough time should be allowed for the performance of certain normal problem solving activities such as: data assemblage of previous year's results, assessment of what works and what doesn't, feed-in of latest research findings, consideration of national guidelines and budget ceilings, analysis of alternative investments, and application of selection criteria. The programming activities of scheduling, workloading, staffing, costing, and supplying the projects should then follow.

The APIC is really no different from the annual estimates cycle, and could be tried out in a few districts and regions. A most important aspect of its implementation is the establishment of professional advisory groups to each organization. Such a group would be coopted from amongst those who have the technical, economic, and programming expertise to contribute to an area's planning effort. Such a group may consist of local agriculturalists, a ministry specialist, some research institute personnel, a university researcher, a MATI tutor, and parastatal crop and input suppliers. What is important is that the best minds are assembled to contribute to the exercise; and it is the responsibility of each functional manager to arrange this well in advance. Much of mutual benefit can occur from such joint exercises, including more rational project selection, better coordinated research, properly scheduled input requests, advance notice of training needs, and realistically timed activities.

D. Training

The present certificate level agro-vet curriculum is too broad, too unfocused, and does not give adequate depth to those subjects which are most frequently needed by extension agents. It is unrealisitic to expect young, secondary school students without much math and science background, for whom agriculture may well not be their first choice of vocation, to be able to learn fundamentals of crops, livestock production, and animal health in a two-year period. Persons with the skills, knowledge, and confidence to be effective agriculturalists will emerge from specialist training that grounds them in core agricultural sciences, and then specializes them in the areas in which they are most likely to work. Formal educational experiences of high quality in both theory and practical work, at all educational levels, will need to be followed by on-the-job training (OJT) and short courses. Professional and technical personnel learn most from the experience of working with more skilled senior mentors in the field, and from targeted short courses that deal with what should be done, in a particular place at a particular time. The tendency to argue for generalist training may come from the uninformed hopes of higher administrators that they can find a budgetarily feasible, lower cost, quick-fix solution to staffing problems. Such policies are not based on an understanding of the nature of the work tasks faced in the field.

Therefore, it is recommended that training at all levels become increasingly specialized in orientation. At the certificate level a solid foundation for future learning can be established in certain broad crops or livestock specialties; and these can be developed further through additional training at later times as and when needed, on-the-job.

The formal levels of training should not be overemphasized. Too much trust has been placed in the formal system, while the informal OJT and short course opportunities have been largely neglected. Both are needed, and each is of equal importance. OJT and short course training possess many advantages, being less expensive, easy to arrange, and take advantage of existing physical facilities and staff. Such training is normally

keyed to actual work about to be carried out, is therefore focused on more practical problems, comes in digestible small units, is targeted to the precise individuals who need to have their skills upgraded, is learned more thoroughly, and the participants are better motivated to receive it. It is highly cost-effective.

Training of this nature is presently insufficiently funded and utilized by agricultural managers, and more funds for transport, maintenance and operating purposes for such courses should be provided. All personnel at MATIs, research institutes, parastatals, the university, and Ministries should respond collaboratively and make themselves available to teach in and contribute to such courses for brief periods.

E. Extension Operations

It is clear from the comparative experience of many developing countries that extension success occurs when technically viable recommendations are combined with adequate price incentives, timely inputs, credit, marketing arrangements, and adequately supported extension. Together, these factors can constitute a critical mass to alter farmer practices. With manpower gaps, shortages of administrative support funds, and insufficient numbers of viable recommendations, the dilemma is how to maximize extension impact under such circumstances.

(1) Deployment of Staff. Extension needs to be concentrated in those areas where viable recommendations exist, and where farming systems research approaches are being used in an action-research/extension context to develop them. At present, extension is often diffused and scattered over wider areas than can be properly serviced or supervised. This wastes the people's money, and in no way advances a policy of equitable distribution of effort. Not to concentrate scarce resources at certain places and times where they can be best utilized is to delay the time when all farmers can be helped. Concentration of efforts area by area in extension is no different than the difficult choices in selecting where to build and staff schools and clinics each year. Not all these facilities can be built at the same time due to a shortage of resources.

(2) Concentration in deployment needs to be complemented by an active and aggressive campaign style of extension which focuses on particular innovation packages already proven viable. (3) Extension through action-research in cooperation with research institutes, MATIs, ministries, parastatals, and farming communities should go forward. The separation of research from extension in daily work in the field is a poor practice and should not be permitted to continue. Each organization supervisor should be held accountable for facilitating collaborative work. (4) Maximum use of the 3,996 sub-technical cadres should be made in areas where some supplementary OJT and short courses can help in concentrated campaigns. While the cadre possesses limitations, it still can contribute some important services. (5) The use of paraprofessionals should be more thoroughly explored. Properly utilized paraprofessionals have often been relatively successful in Senegal, Bangla Desh, China and elsewhere. They provide lower cost service, equitable distribution of information, two-way channels amongst village and research institutes, and an organizational mechanism for the conduct of on-farm trials. (6) The use of proper supervisory work planning and control systems in extension depends on adequate financial and logistical supplies, as well as training of local managers. They should be utilized wherever valid recommendations, adequately concentrated staff, and sufficient administrative support is available. The well-known "training and visit" system is one helpful model under these conditions.

F. Organizational Structures and Coordination

The problems ofsecuring cooperation and coordination amongst many political, public and parastatal organizations at national, regional, district and village levels is a well-known issue for all governments. Integrated agricultural and rural development action requires carefully scheduled teamwork across organizational boundaries, clear understanding of the roles and authority of each unit, and timely unhindered flows of information, materials and supplies.

This managerial ideal is supposed to be achieved in the midst of communications and transport inadequacies, wars, oil price rises, staff shortages, red tape, dispersed populations, droughts, budget cuts, and human foibles. Unfortunately, the effort requires those precise resources that lower income countries most often lack, in the midst of crises that only higher income nations could easily bear.

It is a testament to the strength of the nation, its institutions and its people, that so much is achieved, rather than the contrary. This is mentioned because there is often a tendency to dwell only on the problems without a more balanced perspective. This section necessarily deals with those problems, and neglects the very considerable strengths which make the required improvements possible.

A content analysis of the responses of 179 supervisory managers indicated that 54% of their problems concerned organizational structures and functions, while only 35% were about logistics. Of the 243 individual responses on organizational coordination, regional/district relations, and Ministry of Agriculture and regional/district relations were uppermost. In a goodly number of regions and districts (but not all), respondents reported that RDDs and/or DDDs have forbidden direct communications between functional managers and their technical counterparts at regional, district or ministerial levels. This makes the chain of command overlong, causing serious delays that affect the delivery of services to the people. The routing of communications through the chain adds additional delays because of the volume of communications faced by DDDs and RDDs. This information overload problem sometimes distorts the technical message. Furthermore, there is considerable role confusion being encountered, because the policy/administrative content of certain messages cannot always be separated from the purely technical aspects. Taken together, these authority structures, communications procedures, overload and role problems inhibit both improved administrative as well as technical action. They make it difficult to communicate, discourage the attempt to communicate, and cut down on the exchange of information. They were not the intent of the decentralization effort, nor did they form a part of the McKinsey Report's recommendations and definitions of roles and functions.

Many problems have their origins in old colonial structures and running-in difficulties with the new decentralization system. They seriously affect the efficiency and effectiveness with which personnel can work. The problems are being continuously worked upon, and some additional guidelines may be useful.

Almost all respondents at all levels felt that the current structure has the potential to be responsive to the party and people, depending upon the attitudes and behaviors of the people who operate it. Thus, respondentsstrongly supported the decentralized structure, and wished only to improve its functioning. Understanding of the difference between professional program advisors/implementors, and political/administrative decision makers is essential. The former are only counsels; the latter perform the strategic leadership function in the society within national guidelines. Any operating procedure which inhibits communications among profesional advisors/implementors directly injures the ability of decision makers to secure the best advice and assistance in technical fields. It is therefore recommended that constraints on direct communications amongst professionals be removed on the 95% of communications that are routine. Maximum delegation should be practiced by the leadership & by monitoring correspondence, because prior approval of every matter creates unnecessary bottlenecks. Professionals should always be careful to clear correspondence with policy implications in advance. This is an areaof judgement, in which few specific guidelines can be given. Normally however, the results of non-delegating managers are poorer than those who do delegate fully and well.

Free flows of information must be encouraged amongst all levels. The challenge should be to secure information and advice relevant to solving regional and district agricultural problems. Not to be actively seeking information and staying up-to-date should be accounted as a serious failing in agricultural management.

As a part of this, the Ministry of Agriculture (MOA) should be actively involved in seeking to know the needs of the regions, and arranging to provide more and better services directly to them. At present, most district and regional agricultural personnel feel deserted by their professional colleagues. Travel by headquarters persons should be fairly frequent to stay in touch with agriculturalists in the field. The attitude

should be one of non-directive professional advice by persons whose duties are to stay in touch with national and international experience, and pass it on. At present, respondents report that the volume and quality of services provided to regions and districts is minimal. Technical information dissemination is small, and that which is suitable for extension purposes is very rare indeed. These are all very adverse indicators of a situation requiring correction.

Similarly, parastatal links with regions and districts are inadequate. Parastatal managers at each level should be made coopted members of management teams; and a general policy directive encouraging the very closest professional communication and cooperation amongst parastatals and regions and districts should be made.

G. Finance

The survey documents the inadequacy of allocations, their timeliness, and the lack of concentration of funds where they could be most effective. Respondents report totally inadequate estimates for vehicles, operating costs, maintenance and repair, travelling allowances, equipment and supplies. These shortages create a situation in which staff are unable to carry out their duties for four to five months out of each year.

The underlying problems reflected in this situation appear to be twofold. First is the genuine shortage of funds. Only a larger allocation of funds to the agricultural sector can deal with this. The second is the reluctance to concentrate funds in particular efforts. Rather, there is a tendency to spread funds over many areas at the same time. This appears to result in many well intentioned ventures, all of which are inadequately supported, and therefore rarely achieve their objectives. The attempt to satisfy all legitimate competing claimants for funds has tended to cause discontent by many. Administrators and professionals can only influence these matters to a certain degree. They are basically matters of policy direction. The argument for concentration of resources to form a critical mass has already been made.

H. Logistics

Obviously, logistical shortcomings are primarily a matter of finance. For those areas where viable recommendations exist, where concentrated action-research and extension campaigns are planned, and proper supervision is necessary, adequate vehicles for supervisors and motorcycles and bicycles for field agents are basic essentials.

The other logistical imperative is the joint programming by both users and suppliers of materials and supplies, in order to arrange adequate lead time for orders to be placed, so that inputs arrive at the right places and times. Sitting together, users and suppliers can come to understand each other's needs.

I. Personnel

A misunderstanding of the promotional system exists. Many field personnel think that the MOA is directly responsible for their advancement. In fact, the MOA is only involved in passing the papers to expedite the process which is begun with the submission of annual performance evaluations. The importance of the recommending officer's timely submissions needs to be stressed in a circular to clarify the system.

The system by which accelerated promotions beyond seniority list position can be accomplished should be examined. Regulations which tend to over-restrict the chances of accelerated promotions for deserving individuals should be examined, and then adjusted.

Supervisory managers were revealed by the study to be the most frequently transfered groups of individuals, at 17% per year; while lower level staff had a transfer rate of only 8% per year. The minimum length of time a person should work in one area, especially in the supervisory ranks, is recommended to be 3½ to 4 years.

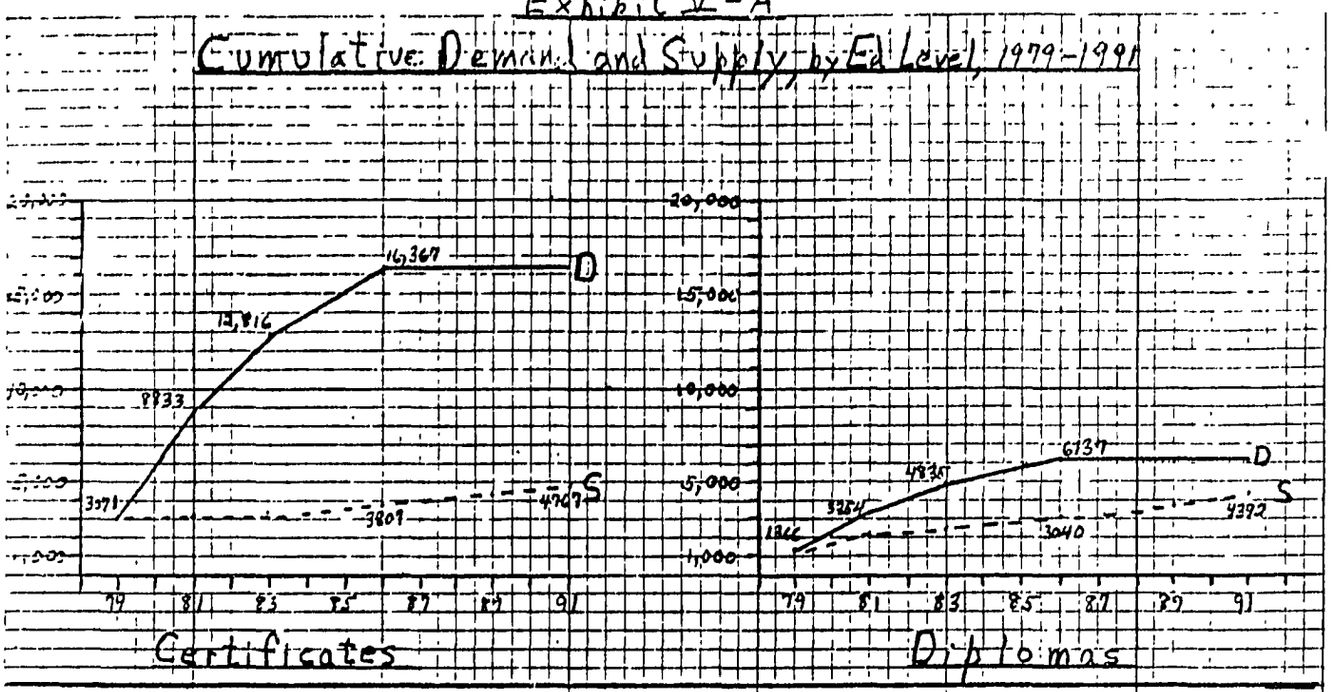
At present only 12% of certificate students are women. This should be increased by a consciousand concerted effort, as women are very likely to be at least equally successful in carrying extension messages to farmers (most of whom are women), as men.

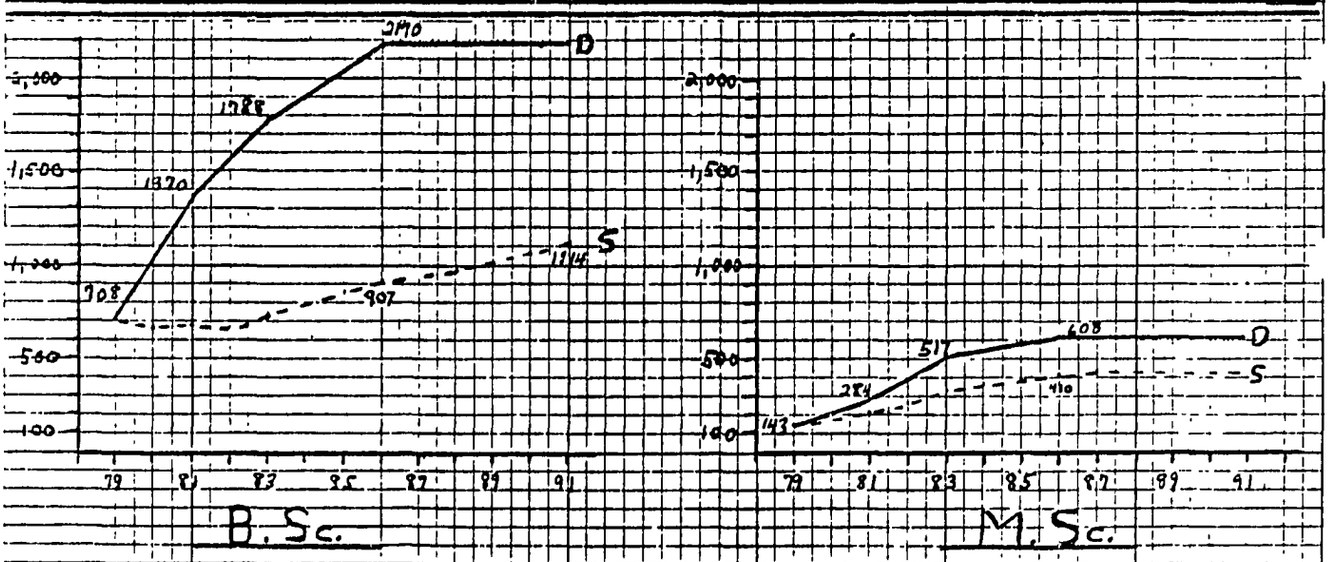
8. Selected Summary Statistical Charts Excerpted from Full Text Report

These are found on the following pages.

Exhibit V-A

Cumulative Demand and Supply, by Ed Level, 1979-1991





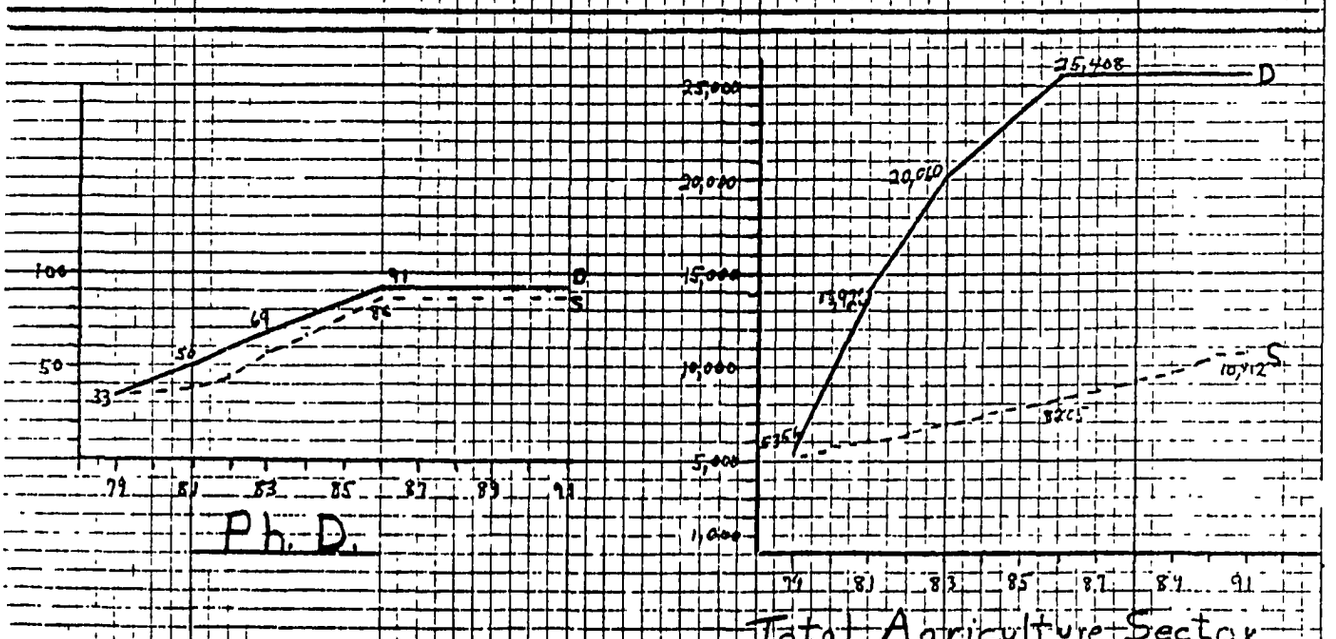


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Exhibit III-J

Filled Posts, Unconstrained Demand, and Ideal Staffing Pattern by Organization Type, Educational Level, and Period

Organization Type	Filled Posts 1979	80-81 Demand	82-83 Demand	84-86 Demand	Ideal Staffing Pattern 1987	Percent Increase 1979-87
MOA-Hdqtrs/Field Sts						
Certificate	60	30	5	0	95	58%
Diploma	35	34	11	12	92	163%
B.Sc.	59	25	31	11	126	114%
P.G.D.	12	-	-	-	12	-
M.Sc.	14	27	20	11	72	414%
Ph.D.	3	0	3	1	7	133%
	183	116	70	35	404	121%
Research Institutes						
Merit	48	-	-	-	48	-
Certificate	290	217	210	27	744	57%
Diploma	154	108	142	17	421	173%
B.Sc.	142	72	15	10	239	68%
P.G.D.	9	-	-	-	9	-
M.Sc.	33	22	118	6	179	442%
Ph.D.	4	4	10	4	22	450%
	680	423	495	64	1662	144%
Training Institutes						
Certificate	130					
Diploma	158					
B.Sc.	83	(Depends on student intake numbers chosen)				
M.Sc.	16					
Ph.D.	1					
	388				388+	
PMO-Regions/Districts						
Merit	82	-	-	-	82	-
Certificate	1843	4733	3310	3049	12,935	602%
Diploma	499	1505	1067	1087	4,158	733%
B.Sc.	144	341	223	199	907	530%
P.G.D.	8	-	-	-	8	-
M.Sc.	8	55	61	55	179	214%
Ph.D.	0	0	0	5	5	500%
	2584	6634	4661	4395	18,219	605%
Other Ministries						
Certificate	65	136	138	110	449	591%
Diploma	237	87	103	45	472	99%
B.Sc.	14	65	43	53	175	150%
M.Sc.	2	3	13	5	23	1000%
	318	291	297	213	1119	285%

Organization Type	Filled Posts 1979	80-81 Demand	82-83 Demand	84-86 Demand	Ideal Staffing Pattern 1987	Percent Increase 1979-87
M-Faculty Ag/Vet						
Certificate	9					
Diploma	6					
B.Sc.	28	(Depends on student				
M.Sc.	43	intake numbers chosen.)				
Ph.D.	23					
	109				109+	
Parascatals						
Merit	32	-	-	-	32	-
Certificate	497	626	320	365	1808	264%
Diploma	269	249	158	141	817	204%
B.Sc.	227	156	104	107	594	162%
P.G.D.	5	-	-	-	5	-
M.Sc.	27	34	21	14	96	256%
Ph.D.	2	13	6	12	33	1550%
	1059	1078	609	639	3385	214%
Private Sector						
Certificate	15	20	0	0	35	
Diploma	8	5	0	0	13	
B.Sc.	11	3	2	2	18	
P.G.D.	1	-	-	-	1	
	35	28	2	2	67	91%
Grand Total						
Merit	162	-	-	-	162	-
Certificate	2909	5762	3983	3551	16,205	457%
Diploma	1366	1988	1481	1302	6,137	349%
B.Sc.	708	662	418	382	2,170	206%
P.G.D.	35	-	-	-	35	-
M.Sc.	3	141	233	91	608	325%
Ph.D.	33	17	19	22	91	176%
	5356	8570	6134	5348	25,408	

Exhibit -A

Projected Cumulative Supply of Agriculturalists
All Educational Levels, 1980 - 1991

Ed Level	1979 - 1986								1987 - 1991					Aggregate Increase 1979-1986	Av. Annual Rate of Increase 1979-1986
	79	80	81	82	83	84	85	86	87	88	89	90	91		
Certificates[1]	3071	3097	3079	3209	3358	3506	3652	3807	3975	4150	4346	4551	4767	736	3.4%
Diplomas	1366	1718	2107	2299	2445	2633	2833	3040	3276	3516	3785	4087	4392	1674	18.0%
B.Sc.	708	663	686	668	740	792	853	907	945	984	1022	1058	1114	199	4.0%
P.G.D.[2]	35	35	35	35	35	35	35	35	35	35	35	35	35	0	0
M.Sc.[3]	143	190	222	275	332	370	391	410	418	418	418	418	418	267	27.0%
Ph.D.[3]	33	39	37	44	58	67	76	86	86	86	86	86	86	53	23.0%
	5356	5742	6166	6530	6968	7403	7840	8285	8735	9189	9692	10235	10812	2929	7.8%

Notes: 1. Includes merits.
2. Assumes current stock of PGDs is maintained at present level.
3. Projections for 1987-91 are at maintenance level, given lack of information upon which more informed assumptions could be made.

ACKNOWLEDGEMENTS

As in any survey of this type and magnitude, many persons contributed to its conception, formulation and implementation. It is impossible to name each individual involved in the effort. Without the willing and enthusiastic assistance of many people, the successful conduct of the survey would have been impossible. Deep gratitude is extended to all who participated, most especially to the respondent supervisory agricultural managers who contributed their time and effort.

The need for the survey was recognized by the Ministry of Agriculture as a logical and essential step in the attainment of the agricultural goals of the nation. The project was made possible by the foresight and support of Dr. J. S. Malacela, MP, Minister of Agriculture, and Dr. S. A. Madalali, Principal Secretary. The Ministry of Agriculture's Division of Manpower Development in particular provided the impetus to the formulation of the survey project. Dr. J. U. E. Mchechu, Director of the Division, and Mr. J. J. Mende, the Manpower Planning Officer, provided the essential day to day direction. Dr. Robert Maxwell, Chief of Party of the West Virginia University contract team in the Division facilitated the necessary discussions and agreements with USAID and West Virginia University which led to the formulation, approval and implementation of the project.

Mr. Howard Steverson, Director of the USAID Mission to Tanzania, Mr. Barry Hill, Assistant Agricultural Development Officer, the GSO officers and staff, and the Controller's office devoted many hours and days. Their assistance and support throughout was marked and appreciated.

The assistance of the Prime Ministers Office, and particularly Mr. H. Kolimba, Principal Secretary, Mr. R. M. Linjewile, Commissioner for Ujamaa and Cooperatives, and Mr. J. B. Semwaiko, Commissioner for Planning is very much appreciated. Special thanks are due to Mr. J. A. Rugumyanhetu, Director of Manpower Planning of the Ministry of Manpower Development. He served not only as a professional consultant to the study team, but provided two full time manpower planning officers for the team.

The Ministry of Agriculture, West Virginia University, and USAID greatly appreciate the assistance of the U.S. Department of Agriculture in making available a highly qualified research interviewing specialist to serve as a member of the survey team.

The successful conduct of the survey would have been impossible without the cooperation and contributions of the regional and district agricultural and livestock development officers; the regional and district development directors; the head of the divisions of the Ministry of Agriculture, and members of their organizations; the principals and staff of the MATIs and the University of Dar Es Salaam; the officials of the various user ministries; and the representatives of the parastatal and private companies. Ms. K. Gleason of AID provided the critically essential computer consulting.

Sincere appreciation is extended to all.

Study Team Staff

The Agricultural Manpower Study was a joint effort of the Government of Tanzania which provided four manpower experts, and the West Virginia University under USAID financing which provided six consultants plus supporting staff. The study team members were:

Dr. Vernon Armbrester, Agricultural Education Specialist, West Virginia University

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Mr. Roger J. Simmons, Team Leader and Manpower Utilization Specialist, Consultant

Miss Margaret Weidenhammer, Survey Research Interviewing Specialist, U. S. Department of Agriculture

In addition to these persons, Ms. Anisa Husain was employed in Tanzania as a data processing specialist. The West Virginia University team was under the general direction of Dr. Robert Maxwell, Chief of Party, and Dr. Rodger Yeager, Director of International Programs.

TANZANIA AGRICULTURAL MANPOWER STUDY

1979 - 1986

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Chapter I: INTRODUCTION

Chapter I: Introduction

A. Rationale for the Study

Approximately eight years have elapsed since the publication of the last agricultural manpower development survey in August 1972.* Since that time significant progress has been made in the training and development of agricultural manpower. However, as noted by the Director of Manpower Development of the Ministry of Agriculture (memorandum of 15 July, 1977), the intervening years have seen continuous change and adjustment in the agricultural sector; and these have directly affected the manpower picture.

Many of the changes reflect a concerted effort to implement the Arusha Declaration, the Musoma Resolution, and the decentralization steps which were taken. An impressive number of economic and social initiatives have required new government policies, structures, social organizations, and relationships. In addition, a drought occurred which revealed many agricultural problems, an enormous increase in oil prices has affected all sectors, and the critical need for increased, food, cash crop, and livestock production has become very clear.

At the same time, many Ministry of Agriculture and other parastatal companies and organizations have been established or have expanded activities. With all of these events has come a chorus of demands for more and better manpower as soon as possible. Fully aware of the situation, the Ministry of Agriculture's Manpower Development Division began to specify the questions it wished answered in an up-dated manpower study. The Division also was concerned with the methodological issues which had plagued manpower planning in many fields. They wished to make progress in evolving increasingly reliable projections upon which future educational intakes could be based.

Thus, a part of the Division's concerns were to evolve a rational basis for recommended staffing levels based on consideration not only of need, but also within

*Yeaman, Schwencke, and Wamunza, Agricultural Manpower Study, 1972.

budgetary and manpower pool availability constraints; and which seem prudent in the light of complex utilization factors affecting the agricultural sector.

Additional considerations were to evolve a solid data base and replicable format for an up-dated study in a few more years; and to have the format reflect the decentralized structure of government. It was also hoped to provide training to those who would carry out such studies in the future in a fully self-reliant manner. From all of these objectives, a detailed terms of reference were developed.

B. Terms of Reference: The Major Objectives

The principle purpose of this study is to respond to five major areas of concern. The particular questions which the Terms of Reference pose are:

Demand and Supply

1. How many persons are needed at each qualification level, in each specialty, for which agricultural sub-sectors through June 1986?

2. Given a set of manpower needs, how many persons can and how many persons should be produced in light of various constraints such as funding levels, general economic outlook, or other significant factors?

Agricultural Education and Training

3. What can be done to improve the qualitative performance at pre-service, in-service, and adult education farmer training institutions with regard to both their programmes and management?

Utilization-Efficiency and Effectiveness of Manpower

4. How can the efficiency and effectiveness of agriculturally specialized manpower be enhanced through improvements in organization structures, personnel system incentives, supervisory activities, and financial, logistical, informational and planning systems and procedures?

Implementation Planning

5. In light of recommendations on the above issues of manpower planning, education/training and utilization, what would constitute the general outline of an implementation

plan to schedule the required activities?

The full terms of reference in the appendices give the highly detailed specifications of data collections objectives and methods of analysis by which these questions are to be answered. The major methodological approaches and methods are discussed in Chapter II.

Chapter III presents the demand data, giving a picture of existing staff, unconstrained demand, and the ideal staffing patterns seen as desirable. Chapter IV is in many ways the most important quantitative analytical section. It lays out the presently projected supply of manpower, given present trends and assumptions; and it details the productive capacities of the training institutions.

Chapter V compares the supply and demand situations, demonstrating the gaps. Chapter VI looks at how the efficiency and effectiveness manpower utilization analyses affect judgements about how many persons should be produced at which levels and in which specialties. Chapter VII then gives the principal recommendations for manpower production in the sector in the years to come.

Chapter VIII analyses and makes recommendations about heightening efficiency and effectiveness in the organizational structure, logistics, finance, research, planning, extension and training fields. This is followed by Chapter IX which discusses and makes suggestions for the qualitative improvement of the educational programs and internal management of the agricultural education system. Chapter X gives preliminary estimates of the unit costs to be used when final decisions are made about exactly how much the training institutes should be expanded, and how many additional staff will be hired.

Chapter XI indicates what the sequence of activities should normally be to follow up the action implications of the study.

Chapter II: METHODOLOGY OF STUDY

Chapter II: Methodology of Study

A. Overview

Over the past 12 years there have been two manpower supply and demand studies done by the Ministry of Agriculture. The last was that done by Yeaman, Schwencke, and Wamunza in 1972; and before that the study by Nelson in 1967. Both of these attempted to grapple with the projection of manpower needs and the provision of trained personnel by the educational system. Within the confines of the methodologies used, each of these was able to contribute to policy making through their quantitative forecasting, as well as making recommendations relevant to qualitative aspects of agricultural education, and in suggesting utilization improvements.

There has always been and will likely always be continuing debate about the proper methodology to employ in manpower studies. Unfortunately, manpower planning is one of the more imprecise areas of development planning, and is not a fixed and exact science. Both the Ministry of Manpower Development and the Ministry of Agriculture (in particular) have been concerned about this issue for some time. They wished to make progress in evolving increasingly reliable projections upon which future educational intakes can be based.

The last two studies have been based on demand estimates being made by a limited number of persons at a centralized headquarters location, using a combination of three basic approaches.

The program approach attempts to secure a grasp of the number of agricultural projects and programs being carried out over a plan period, the workloads, and types of agricultural personnel needed to accomplish the specified tasks; and therefore the effective demand.

The ratios approach posits a target set of optimum numerical relationships between different levels of personnel. For example, in the 1972 study, it was assumed that there should be a ratio of 1 graduate to 2 diplomats to 20 certificate holders to 10,000 farm households. Demand is then calculated to close the gap between existing and

desired staffing magnitudes and proportions.

The budget constraint approach takes the existing staffing pattern and makes projections for each level based on the expected annual increases in the personal emoluments line-item, and thus the number of personnel who can be afforded. The budget constraint is derived either from a ceiling set by the Ministry of Finance; or a review of average increases in past years.

Each of these approaches has its strengths and limitations. On the strengths side, they are useful in making estimates in a short time at low cost, using certain rules of thumb as guidelines. There is a good amount of common sense and logic in the enumeration of projects and their personnel needs, just as it is only realistic to apply a budget constraint to any set of figures to keep them within the bounds of feasibility. Similarly, ratios are an expression of broad staffing patterns which experience might indicate have been desirable.

On the other hand, each of the above approaches also has its limitations. The major concerns which the Government and professionals in the field have about them are:

(1) Programs and projects are always in flux and rarely does Government know all the agricultural efforts it will be making in coming years. In addition, since there is always a significant time lag between the point manpower demands are known and when training production could be increased, shortages would likely continue through the actual program implementation period.

(2) Broad ratios tend to be inflexible, and thus cannot take into adequate consideration the diverse agricultural situation in the country which may require staffing patterns with significant variations.

(3) Neither ratios nor budget ceilings consider changing needs from past patterns. They cannot capture sufficiently detailed information on specializations required, nor changes in the ratios among qualification levels, over time.

(4) Neither the ratios nor the budget constraint approaches base their estimates on the volume of agricultural development work that has to be or could be accomplished; and therefore what numbers and skills at which qualification levels are required to do the job in different parts of the country. Each is based on a broad formula which is unable to uncover the important practical differentiation needed among staff resources.

(5) The above approaches do not utilize the opinions and perspectives of the principal supervisory managers in the field; and not even all of those at headquarters. These personnel can be expected to possess practical information about the agricultural development potentials and problems in their geographic and functional specialization areas of responsibility. The variations from place to place in farmers, crop and livestock patterns, and other situational factors so important in operational planning, cannot be sufficiently considered without detailed consultations.

The Ministry of Agriculture was therefore understandably concerned about its ability to plan and justify an agricultural education and training supply capability which will respond to the genuine needs of the agricultural sector

The remainder of this chapter describesthe decisions made about methodology to deal with the dilemmas just presented in this overview. No claims can be made to having resolved all of the problems raised, but some genuine progress has indeed been achieved. The following sections give a general description of the end users surveyed, who the individuals were, the interviewers themselves, the data collection and processing stages, and the various survey mechanisms employed. An understanding of a few quantitative survey forms is very helpful in coming to grips with the data subsequently presented in chapters III and IV on demand and supply.

B. End Users Surveyed

The survey was designed to interview every end user organization of agriculturally specialized manpower. Two hundred and ninety-nine (299) organization units were included

in the survey, and two hundred and ninety-two (292) or 98% responded. These included all Ministry of Agriculture divisions, research institutes, and MATIs. From the Prime Minister's Office there were the forty four (44) regional crops, livestock and irrigation offices; and eighty-four (84) district crops and livestock offices. Three other ministries were interviewed, Defense, Home Affairs, and Education. Forty seven (47) parastatals responded, along with the University of Dar Es Salaam Faculty or Agriculture and Veterinary Science, and three private sector organizations. Exhibit II-A lists these organizations.

Exhibit II-A

End Users Surveyed and Respondents

End User Organizations	Number of Organization Units Included In Survey	Number of Organization Units Which Responded	%
Ministry of Agriculture (Kilimo)			
Manpower Development Division	1	1	100
Crop Development Division[1]	1	1	100
Livestock Development Division[1]	1	1	100
Irrigation Division	1	1	100
Sectoral Planning Division	1	1	100
Research Institutes[2]	12	12	100
MATIs	12	12	100
Total Kilimo	29	29	100%
Prime Minister's Office			
Regional Headquarters	20	20	100
Crops	20	20	100
Livestock	20	20	100
Irrigation	4[3]	4	100
District Headquarters			
Crops	84	82	98
Livestock	84	80	95
Total PMO	232	226	97%
Other Ministries	3	3	100%
UniDar-Morogoro[5]	1	1	100%
Parastatal Organizations[6]	47	47	100%
Private Organizations	3	3	100%
TOTALS	299	292	98%

Notes: 1. Research Institutes of the Crop and Livestock Divisions are shown under Research Institutes. Information on livestock institutes was received in aggregate form, rather than by individual institute.

2. Research institutes include Uyole Research Centre which is legally a parastatal organization; and the Tropical Pesticide Research Institute which is under the Ministry of Regional Cooperation. This facilitates later analysis.

3. Only 4 Irrigation organization units had serparate position establishments in the field. However, irrigation positions appear in both regions and districts.

4. See footnote 2.

5. The Faculty of Agriculture, Forestry, and Veterinary Science (exluding the Forestry Division) are shown under the University entry.

6. See footnote 2.

C. Supervisory Managers Interviewed

Within each organization unit, the major supervisory manager was interviewed, both at headquarters and field levels. This assumed that he/she would be amongst the most reliable informants of what a specific company or area's needs are; and would be able to capture the varied demands of the sector in diverse parts of the country on different types of work. Almost every DADO/DLDO, RADO/RLDO, Division Director, and Managing Director of every organization was reached personally. On a few very rare occassions, the assistant was interviewed.

D. The Interviewers

Four teams of two persons each were formed to travel on carefully defined routes to carry out the interviewing in May and June of 1979. Each team consisted of one Tanzanian from either Kilimo or Utumishi, and one visiting consultant. The teams traveled together for from three to four weeks. Through close consultations and mutual observation it was felt that distortions in data collection were mitigated. Corrections in interviewing techniques, data interpretations, and socio-cultural understanding were possible on-the-spot. The educational backgrounds of the interviewers were all of tertiary education. They included four B.Sc.s, three Masters, and two persons with doctorates. Of the overseas team members, only one had not been in Tanzania before. All of the others had lived and worked in Africa for an average of over four years each.

E. Data Collection Process

The questionnaires used in the survey were designed by all national and visiting team members, working together collaboratively. Dialogue was extensive over the conceptual and semantic issues involved in the drafting of the questionnaire, and reasonable clarity in English was achieved. The questionnaires were then pre-tested in two regions and a few districts close to Dar Es Salaam. Extensive revisions were made, based in large part on the advice of the Director of Manpower Planning at Utumishi. Informal interviewer training was held with mutual critques of styles and methods. One team member was a specialist in interviewing methods and could serve as resource person for this.

Subsequent to the pre-test, a meeting of a large group of respondents and manpower management officers from most regions, parastatals, and other ministries was held in Dar Es Salaam. Details of the survey, its rationale, methods, and the schedule of interviews were covered. Copies of the questionnaires for every district and regional organization unit were distributed through those attending the meeting. Thus, respondents would have an opportunity to be familiar with the questionnaire, to gather detailed data that might be required, and to consider answers to the utilization inquiries. With distribution of the questionnaires in advance there was full cooperation from all responding units. Many had completely filled in the questionnaire before the arrival of the interview teams. To ensure accuracy, the interviewing team would then review the questionnaire in detail with each respondent, together with the manpower management officer. Interviews normally averaged at least one and one-half hours, oftentimes more, depending on the complexity of the local situation.

F. Data Processing

Data processing first involved editing of the raw data forms, coding, and cross-checking of coding accuracy under experienced supervisors. The data was then punched on to computer cards at a computer center. Unfortunately, due to delays in

programming, the interim summary report had to be based on hand tabulated data. With continuing computer problems, the data processing was then relocated.

Errors in the original card punching were found (but not the coding); and the entire deck of cards had to be rechecked against the original raw data forms to ensure accuracy. In essence, a long and laborious recoding exercise causing six months of delays had to be endured. Because of the number of double checks, however, the data is considered to be more free of coding and punching errors than could ever be obtained in any similar study.

Other segments of the questionnaire on utilization and agricultural education were easily hand tabulated. Therefore, such methods were employed for those sections.

G. Survey Mechanisms: Questionnaires for End User Organizations

In the following sections, a brief overview of the questionnaires utilized in the survey are given. While such matters are usually dealt with only in appendices of reports such as this, serious readers of this study will benefit from the time spent in reviewing this section. Many questions that may occur in later chapters can be answered through information gained here.

1. Baseline Data. Questionnaire tables 1, 2, 3, and 4 attempt to take a picture of the agricultural manpower situation as of June 30, 1979. Table 1 attempts to capture the existing staffing pattern, including the authorized (budgeted) establishments, the number of vacancies, actual filled posts, and the educational levels of incumbents. Provision was also made in Table 1 to note how many incumbents were non-citizens on establishment. As will be noted, sub-technical cadres were not covered in this survey, although they play important roles in the agricultural sector (actually and potentially). Agriculturally specialized personnel were interpreted to include those in allied professions such as economists and engineers who practice their skills within the context of agricultural operations. With regard to educational levels, personnel without the

TABLE NO. 1

Organisation: | Region or Division: | District or Section: | Sub-Section: | Parast / Ag / LS/Vet | Trg / Res

Titles of Posts (If necessary, add titles on the blank lines)	Number of professional and technical posts as of 30 June 1979: How many - -							Were any of those posts filled by non-citizens? ( ) No ( ) Yes How many non-citizens in each post? (If yes) Which post?
	Established posts?	Vacant posts?	Filled posts?	Posts filled by educational levels				
				Cert.	Dipl.	B.Sc.	Other (specify)	
1	2	3	4	5	6	7	8	9
Senior Officers SPAC through AO III SPLC through LO III SPVC through VO II								
Field Officers PAFO through AFO III PFLO through LFO III								
AFA I and LFA I								
AFA II and LFA II								
Totals								

major educational qualifications were classified as "through merit." The posts and positions used for each cadre were the normal civil service classifications. For parastatals, and the private sector, the compensation levels were utilized to provide an equivalencing measure.

Please note that this table, as with all others, contains headings for each organization unit interviewed, the region or division, the division or section, and the sub-section or professional area into which the organization unit fits. These headings naturally made it possible to cross-tabulate all data from the most disaggregated level to the most aggregated compilations.

Table 2 attempts to capture a detailed description of each of the non-citizens employed in professional or technical posts not included on establishments. It also requested respondents to indicate whether in fact any of the technical assistance personnel listed here would indeed need replacement by a Tanzanian that had not already been scheduled. This was to cover situations where a replacement was not felt to be necessary when the project was initiated; but was subsequently discovered to be desirable.

Table 3 was an attempt to capture information about two major manpower planning factors, the internal transfers that occur within the organizations (Columns 2 to 4), and the attrition of personnel that could normally be expected in a year's period of time (Columns 4 to 9). Attrition was interpreted to mean the total loss of personnel from the agricultural sector through retirement, death, dismissal, and resignation.

Internal transfers are used later in the study to measure the amount of disruption that may affect efficiency and effectiveness of operations. Attrition measures are utilized to calculate how many replacements will be required to cover normal annual vacancies that occur each year in the future. Both the transfer and attrition data rest upon an assumption that the fiscal year 1978/79 is fairly typical of a normal year.

Table 4 represents an attempt to gain highly specific data about the principal work assignment of each person currently; and the original field of training which that person received. The motivation behind the table was to see what the contemporary alloca-

TABLE NO. 2

Organisation: | Region or Division: | District or Section: | Sub-Section: | Parast Ag LS/Vet | Trg Res

Do you have any non-citizens employed in professional or technical posts who were NOT included in establishment posts as of 30 June 1979?

( ) Yes — Please fill in the Table below ( ) No — Please skip to the next Table

For EACH non-citizen in a professional or technical post on 30 June 1979, please give Position Description (principle duties and skills)	What is the type of employment? (Tick Column 2 or 3, and if "aided", name source)			In which financial year is the non-citizen expected to leave the post (if known)?	Is a Tanzanian now in training as a replacement? (Tick)			If you need any additional posts to replace non-citizens not on establishment, what post titles?
	Gov't or company contract	Aided post	Aided by:		Yes	No	Don't Know	
1	2	3	4	5	6	7	8	9

TABLE NO. 3

Organisation: | Region or Division: | District or Section: | Sub-section: | Parast. Ag LS/Vet | Trg Res

Titles of Posts (If necessary, add titles on blank lines)	Number of actual or anticipated professional and technical staff changes from 1 July 1978 through 30 June 1979							Number of anticipated retirements of current professional or technical staff members from 1 July 1979 through June 1986
	Arrivals		Transfers	Attrition due to:				
	From Other Areas	New Allo-cations		Retire-ment	Death	Dis-missal	Resig-nation	
1	2	3	4	5	6	7	8	9
Senior Officers SPAO through AO III SPLO through LO III SPVO through VO II								
Field Officers PAFO through AFO III PFLO through LFO III								
AFA I and LFA I								
AFA II and LFA II								
Totals								

Organi- sation: | Region or Division: | District or Section: | Sub- Section: | Parast Ag LS/Vet | 6 Trg Res

TABLE NO. 4 What are the major specialisations in which your existing and newly allocated staff —

Specialisation (Please write in)	—will actually be working as of 30 June 1979, by educational level?				—have been trained, by educational level?			
	Cert	Dipl	B.Sc.	Other (specify)	Cert	Dipl	B.Sc.	Other (specify)
1	2	3	4	5	6	7	8	9

tion of personnel to work assignments actually is, as a reflection of the priorities which supervisory managers decide are required in each local situation. The area of original training information would permit some contrast to be made between existing work and the specialization in which a person received agricultural education, to see if significant movements had occurred.

2. Unconstrained Demand. Table 5 asked each respondent to list how many more or how many fewer staff members were needed at which educational levels and in which specialization over the next seven years. This time horizon was divided up into fiscal years 1980 and 1981, 1982 and 1983, and 1984 through 1986 to make the estimation easier to project. Before posing this projection question, however, seven other questions about the underlying reasons involved in making projections for the respondents' area were posed. These concerned the agricultural potential of the place, the number of villages and population figures, and their expansion or contraction. Current covereage of the villages by agents, expansion and improvement of operations needed or planned, the initiation of new projects, and any other factors affecting manpower needs were explored in great detail. Thus, when it came time to put down the figures for each educational level and field, a relevant review had been held.

3. Training Needs of Present Staff. Table 6 was added to the questionnaire because the study interviews would permit a quick training needs assessment of present staff to be conducted. In particular, item b. short term training in Table 6 would provide an overview of the practical skills areas which present staff require, as viewed by their immediate supervisors. The results provide an excellent guideline for short course development to supply practitioner needs.

4. Utilization. Five pages of the questionnaire are devoted to questions about personnel, financial, logistical, informational, organizational, administrative supervisory, and research, planning/programming, short term training, and extension operations aspects of agricultural development work in the sector. (See copy of form in Appendix.) These questions allowed every supervisory manager to express him or herself on the major

Organi-sation:	Region or Division:	District or Section:	Sub-Section:	7 Parast Ag LS/Vet	Trg Res

Manpower Projection of Future Needs

The next few questions ask for your assessment of how many professional or technical staff members you believe you could use effectively in the next 7 years. But before proceeding with those questions, we would like to know more about some of the factors which you may take into account. For example,

1. What is your view of the agricultural potential of this area?

2. How many villages do you have now?

3. Do you expect to have more villages or more people in the next 7 years? (Please explain)

4. What is your situation with regard to coverage of villages by your professional and technical staff?

5. What activities, if any, currently in your area of responsibility do you think should be expanded or improved in the next 7 years?

6. Do you expect to start any new projects? (Please explain)

7. Is there anything else that might influence your professional and technical manpower needs in the next 7 years?

8. In the following tables, the next 7 years are divided into 3 survey time periods:

Survey Period A	2 years	July 1979 through June 1981
Survey Period B	2 years	July 1981 through June 1983
Survey Period C	3 years	July 1983 through June 1986

We want your professional assessment of how many more or how many fewer professional or technical staff members in various specialisations and educational levels you could use effectively in your area of responsibility, without concern for possible budget constraints or shortages of trained personnel. And we want to know only additional or fewer posts — not cumulative numbers of posts — in each time period.

Organi-sation:	Region or Division:	District or Section:	Sub-Section:	Parast Ag LS/Vet	8 Trg Res

TABLE NO. 5a How many more (+) or how many fewer (-) staff members at each educational level with formal training in the specialisations you select do you think you could use effectively in the 3 survey time periods —

July 1979 to June 1981 (Survey Period A) compared to posts filled in June 1979

July 1981 to June 1983 (Survey Period B) compared to Survey Period A

July 1983 to June 1986 (Survey Period C) compared to Survey Period B

Educational level and specialisation (Please write in)	July 1979 through June 1981	July 1981 through June 1983	July 1983 through June 1986	Priority**
1	2	3	4	5
CERTIFICATE				
DIPLOMA				
B.SC.				

** Tick the one specialisation at each educational level to which the highest priority should be given.

THIS TABLE IS CONTINUED ON THE NEXT PAGE FOR HIGHER EDUCATIONAL LEVELS

10

Organisation: | Region or Division: | District or Section: | Sub-Section: | Parast Ag LS/Vet | Trg Res

TABLE NO. 6 How many persons on your staff at each educational level need either long term or short term training in which specific subject area? What length of time would you suggest for the training?

Specific subject areas in which training is needed	Certificate		Diploma		B. of Science		Other - specify	
	No. Who Need	Suggested Length	No. Who Need	Suggested Length	No. Who Need	Suggested Length	No. Who Need	Suggested Length
1	2	3	4	5	6	7	8	9
a. Long term training								
b. Short term training								

problems affecting everyday activities. Many questions were open ended to allow considerable dialogue. Others were closed end, to secure ratings of the severity of problems. Confidentiality was preserved and assured to respondents. These questions were designed to provide an empirical basis for making analyses and recommendations for that section of the study which addresses improvements in the efficiency and effectiveness of manpower.

5. Agricultural Education. The questionaire contained one page of questions for the supervisory managers of end user organizations who employ the products of the educational institutions. Ratings of the quality of preparedness of recent graduates were requrested; and suggestions for improving training were solicited.

H. Other Utilization Inquiries

In addition to interviews with all supervisory managers of end users, supplementary interviews were held with many other agriculturalists. These included personnel at donor organizations, university staff, Government administrators and planners. Literature coverage of much of the considerable Tanzanian agricultural and rural development experience was accomplished; and the comparative experience from other low income nations was covered as well. This was done to ensure thorough canvassing of views and to place specific problems within a larger context of world experience.

I. Questionnaires on the Agricultural Education System

In addition to the page of questions in the supply and demand questionnaire, a number of other separate inquiries were launched to examine the agricultural education system. Eight of twelve MATIs were visited, of all different sizes. All principals, coordinators of studies, department heads, many students and teachers were reached. Newly graduated staff from MATIs were also surveyed to secure their retrospective views on their education and its relevance to their field work. The forms utilized in these inquirires and the detailed results are to be found in the appendices.

J. Data Validity, Treatment and Limitations

All studies possess strengths and shortcomings of various types. These characteristics make their information more or less useful as bases for interpretation and the drawing of accurate conclusions. Every effort was made in this study to anticipate and avoid the common pitfalls of inexact expression of questions, inaccurate recording of responses, double counting, distoring intercultural communications hurdles, and so forth. Nonetheless, some problems did occur as with all studies. This section of the methodology chapter will draw attention to where the data is especially sound and reliable; and to those areas where its shortcomings and the shortcomings of the instruments might not be as apparent as they should be to future users of the data base.

The major areas of strength in the data are the baseline information on existing staff in Table 1, the projections of needs in Table 5, and the short term training needs found in Table 6b. The reasons for this confidence are expressed in the quantitative demand chapter which follows. The limitations in the data and the instruments are as follows:

1. Most research institute manpower information was collected from a centralized source due to time pressures and shortage of funds for more field travel. The forms in which such staffing data are kept at the Ministry does not permit ease of manipulation, as the information was not originally intended for aggregate analysis of the type employed in this study. While the data is sound, it may not be as good as what could have been secured from Institute Directors in the field.

2. Parastatal organization data will probably not be precise in the area of authorized establishments as many of them do not follow that concept in budgeting. In addition, it was more difficult to secure parastatal data. Detailed records are usually kept at decentralized company levels of which the parent corporation did not always have copies. Occassionally, inferences had to be drawn.

3. Table 4b data which asked for the specializations in which personnel were originally trained implicitly required supervisory managers to know all of their staff so well that even their earlier educational specialty was known. Some guessing was inevitable, from time to time. While the data is probably useful as indicating the situation

it should not be treated as fully valid. Because of this, the data is not utilized in this study to any great extent to draw major conclusions. In addition, there were a number of organizations where this table could not be filled in, particularly for the parastatals.

4. Table 4a data which asked for the major specializations in which current staff are primarily assigned, has considerable strength, and is utilized in the study. However, it must be recalled that there are a great number of personnel who may spend (say) 45% of their time in one major area of endeavor; but they also may spend significant time in other specialty areas. Thus, in interpreting Table 4a data, care should be taken not to carry primary work assignment interpretations beyond reasonable limits. Most persons perform multiple functions across a few specialties, including the primary work assignment.

5. The specializations listed in Tables 4a and 4b, and then in Tables 5 and 6a and 6b suffered occassionally from a lack of adequate specificity. For example, some respondents would tend to choose a broad specialty as the general academic training area from which a person should come, rather than give a more detailed description of exactly in which field a person is needed. Therefore, it is possible that some of the general crops and animal science general selections could have been more finely broken down. This is not felt to be a serious shortcoming at all, but it should be mentioned as an area for improvement in the next study.

6. More serious concerns about specializations data concern the question of judgement by supervisory manager respondents. For example, most livestock managers come from the animal health/veterinary science specialization areasand not from the more general animal science/production area. It is possible that a bias towards the veterinary dimension has conditioned the livestock development re_ponses. This might have overweighted the number of requests for animal health and professional veterinarians. There is probably no way of knowing to what extent this is true. In future studies, such respondents should be asked to consider to what extent their views may be overly conditioned by their natural commitment to their profession; and to exercise careful scrutiny of their own unconstrained demand requests by consulting more closely with their animal production colleagues.

7. In the specialty group of agricultural economics, there are a number of diverse sub-specializations lumped together. This is also true of the technical specialties and other categories. The detailed computer print-outs of each sub-specialty area should be consulted and those that show which organization is requesting which types of personnel, in order to be able to understand the exact situation.

8. Similarly, there are certain categories such as "research" and "miscellaneous" which occassionally account for a number of requests. Sometimes, a respondent was unable to be particularly articulate, or an interviewer might not have been quick enough to record the exact meaning of a response. Thus, these generalcatchallcategories had to be created.

9. The other area of concern is home economics/food science, where it may well be that respondents' requests are conditioned by a cultural/sexual bias. This exists in most countries, and should naturally be explored further.

10. The major interpretive problem in the specialization data concerns the authority which is to be attributed to respondents in their requests. This study argues strongly that the data is of very high quality, better than that obtainable by consulting only headquarters. At the same time, the respondents to this study are not agricultural sector planners who have responsibility for allocating investments in human resources over a variety of fields with differential rates of return occuring in each. Respondents did not have a national perspective for the priority order in which personnel should be produced in the future. Thus, the study implicitly treats all categories of personnel as of equal weight in the sector's human resource development efforts.

As the study explicitly cautions, this is not a tenable perspective. The broad outlines of the respondents views should be treated as authoritative for his/her area, generally speaking. However, the study also advocates that in the planning process, a national judgement be exercised as to sequence and priorities in the production and allocation of manpower. Thus, while the data can and should be relied upon, it should not be allowed to rule at all times. It is no substitute for the exercise of top management judgement based on the critical national and sectoral perspective.

Chapter III: Quantitative Demand Data Presentation and Analysis

Chapter III: Quantitative Demand Data Presentation and Analysis

This chapter presents quantitative data on the agricultural manpower picture in the total sector as uncovered in the survey. Only the broad summary figures are shown here. Some limited descriptive analysis and interpretation is included. Detailed figures are available in the appendices for more careful examination and operational analysis. A large number of cross-tabulations are available, with the quantitative information broken down by educational level, civil service position, specialization, and each organizational unit which was interviewed. Although very extensive, the computer print-out appendices of this report should be treated as integral parts of the study. They have been designed to be utilized in every day manpower analysis, practical planning, and decision making. They can be employed at institute, company, district, regional, and centralized levels of administration.

Four categories of information are presented in this chapter:

(1) Baseline Data on Existing Staff. This includes the present authorized establishment, the number of filled posts, vacancies, current work assignments of staff, and their areas of original training. These figures have been cross tabulated by organization types, educational levels, and position rank. Some information is available about non-citizens filling establishment posts; and the number of non-citizens holding technical assistance positions.

(2) Turnover and Attrition. Although this data is not strictly speaking 'demand' data, it is presented here and utilized in the following supply chapter's analyses. The movement of personnel within the agricultural sector by changing organizations or areas of work have been captured to a limited extent by "turnover" data. "Attrition" by contrast, distinguishes those personnel who have left the category of agriculturally specialized personnel entirely, and no longer work primarily in the agricultural field.

(3) Unconstrained Demand. This category of data presents information on the numbers of new additional agricultural personnel which supervisory managers of each organizational unit saw as desirable to complete their ideal stafring pattern.

(4) Specializations Requested. The unconstrained demand information originally collected was divided into 160 fields of agricultural specialization for each educational level. This section presents the requests for each level, summarized into 22 broad categories. The complete and detailed requests on the 160 specialty fields possible is found in the computer print-out appendices, for every organization responding to the survey.

A. Baseline Data on Existing Staff

1. Authorized Establishments, Filled Posts and Vacancies - 1979

There are 8,509 established posts for professional and technical staff. Filled posts total 5,356, leaving a vacancy gap of 3,153 posts, or about 37%.

Establishment	8,510
Vacancies	3,153 (37%)
Filled Posts	5,356

a. Organization Type

Exhibit III-A depicts the distribution of personnel by organization type. The largest numbers are employed by the PMO in the regions and districts, followed by the parastatals, the research institutes, the training institutes, other ministries, the Ministry of Agriculture headquarters and field stations, the University Faculty of Agriculture, and lastly the small private sector.

PMO-Regions and Districts	2,584
Parastatals	1,059
Research Institutes	680
Training Institutes	388
Other Ministries	318
MOA-Hdqtrs & Field Sts.	183
UDSM-Fac. of Ag/Vet Science	109
Private Sector	35
	5,356

b. Educational Level

When categorized by educational level as in Exhibit III-B, the following breakdown occurs.

Merit	162
Certificate	2,909
Diploma	1,366
B.Sc.	708
Post Grad Dipl.	35
M.Sc.	143
Ph.D.	33
	5,356

Exhibit III-A

Establishments, Filled Posts, and Vacancies for Agricultural Sector by Organization Type, 30 June, 1979

	Est'd Posts	Vacancies No.	Vacancies (%)	Filled Posts 79	Org Type as % of Total
MOA Hdqtrs/Field St	-*	-	-	183	3
Research Institutes	-	-	-	680	13
Training Institutes	-	-	-	388	7
	1,880	629	(33%)	1,251	23
PMO-Regions/Districts	4,442	1,858	(42%)	2,584	48
Other Ministries	345	27	(8%)	318	6
UDSM-Fac. Ag. & Vet.	150	41	(27%)	109	2
Parastatals	1,633	574	(35%)	1,059	20
Private	59	24	(41%)	35	1
TOTALS	8,509	3,153	(37%)	5,356	100

Notes: * - = Not Available

Exhibit III-B

Establishments, Filled Posts, and Vacancies for Agricultural Sector by Educational Level, 30 June, 1979

	Est'd Posts[1]	Vacancies No.	(%)	Filled Posts 79	Ed Level as % of Total
Merit	-	-	-	162	3
Certificate	4,101	1,030[2]	(25%)	2,909	54
Diploma	3,087	1,721	(56%)	1,366	26
B.Science	1,030	322	(31%)	708	13
Post Grad. Diploma	53	18	(34%)	35	.5
M.Sc.	196	53	(27%)	143	3
Ph.D.	42	9	(2%)	33	.5
	8,509	3,153	(37%)	5,356	100

Notes: 1. Established posts do not exist by educational level. These breakdowns are rough estimates based on the entry qualifications for AFA II, AFA I, FO, and Professional Officer positions. For analytic convenience, professional officers have been divided between B.Sc., PGD, M.Sc., and Ph.D. levels. They have been allocated according to the present proportions amongst the 919 filled posts for these levels.

2. Certificate Vacancies = Certificate Establishment Minus Total of Certificate and Merit Filled Posts

When educational levels are cross tabulated by organization types for all the 1979 filled posts, the configuration shown in Exhibit III-C results.

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FILE NONAME (CREATION DATE = 01/31/80)

* CROSSTABULATION OF * * * * * * * * * * * * * * * * * * *
ORGTYPE ORGANIZATION TYPE BY EDLEVEL EDUCATION LEVEL
* PAGE 1 OF 1

ORGTYPE / EDLEVEL	COUNT	MERIT 1.1	CERTIFICATE 2.1	DIPLOMA 3.1	B.SC. 4.1	PGD-MSC-PH.D. 7.1	ROW TOTAL
1. REGION- DISTRICT		82	1843	499	144	16	2584
							48.2
2. KILIMO FIELD		0	60	35	59	29	183
							3.4
3. KILIMO RESEARCH		48	290	154	142	46	680
							12.7
4. KILIMO TRAINING		0	130	158	83	17	388
							7.2
5. OTHERMINISTRIES		0	65	237	14	2	318
							5.9
6. PARA STATALS		32	497	269	227	34	1059
							19.8
7. PRIVATE SECTOR		0	15	8	11	1	35
							0.7
9. UNIVER-SITY		0	9	6	28	66	109
							2.0
COLUMN TOTAL		162	2909	1366	708	211	5356
		3.0	54.3	25.5	13.2	3.9	100.0

Exhibit IIIc

Filled Posts 1979 by Organization Type and Educational Level

c. Position Rank

Exhibit III-D characterizes the breakdown by civil service position and equivalent positions (by salary level) for the parastatal and private sector.

Exhibit III-D

Filled Posts 1979 by Position Rank[1] and Organization Type

Organization Type	Prof/Sr Officer	Field Officer	AFA-LFA I	AFA-LFA II
PMO- Regions/Districts	164	422	410	1,488
MOA-Hdqtrs & Field Sts.	91	30	24	38
Research Institutes	188	126	110	256
Training Institutes[2]	100	158	0	130
Other Ministries	67	83	125	43
Parastatals	339	238	481	1
Private Sector	13	7	15	0
UDSM-Faculty Ag/Vet	94	6	9	0
Totals:	1,056	1,070	1,274	1,956

Notes: 1. Position Rank refers to civil service positions or the equivalent levels in the parastatal and private sub-sector, as measured by salary level.
2. A detailed breakdown of training institute staff by position rank was not available. Therefore, those staff with diplomas were assigned to Field Officer level and those with certificates were assigned to AFA/LFA II level, for purposes of convenience.

An interesting picture of the relation of postion rank to educational level is depicted in Exhibit III-E.

Exhibit III-E

Filled Posts 1979 by Educational Level and Position Rank

Educational Level	Professional/Senior Officer	Field Officer	AFA/LFA-I	AFA/LFA-II
Merit	3	31	71	57
Certificate	18	194	798	1,889
Diploma	125	836	405	0
B.Sc.	699	9[1]	0	0
PGD/M.Sc./Ph.D.	211	0	0	0
	1,056	1,070	1,274	1,956

Notes: 1. Nine persons of FO ranks with B.Sc. degrees were recorded. It is hypothesized that these are new graduates who have not yet been officially promoted.

The number of professional/senior officers with educational backgrounds of merit, certificate, and diploma qualifications was carefully checked. The overwhelming majority were employed by parastatals, with only a few being in the civil service. It is hypothesized that the civil service personnel are older, more experienced staff who were promoted by merit, possess experience felt to be equivalent to formal qualification holders, and/or who had been unable to attend formal courses earlier in their careers. Only 146 persons or 2.7% of the entire sector's personnel are in this situation.

d. Principal Work Assignments by Specialization

The current assign ments of the 5,356 present staff by educational level are displayed in the computer print-out Exhibit III-F. Each of the agricultural sector staff was classified in one of 21 specialty groups according to the field in which he/she was reported as primarily working. This table gives a fairly accurate picture of major work assignments, generally speaking. However, it is not as useful as the detailed computer print-outs on this subject which should always be utilized for in-depth analyses.

e. Areas of Original Training by Specialization

Table III-G gives a summary by 21 specialty groups and educational level of the areas of original training of the present filled post 1979 staff. A more detailed print-out analyzed each of the 160 specialty areas comparing original training fields with current assignments. This analysis arrived at two principal conclusions. First, at the certificate level, the flow of personnel from more general backgrounds to more specialized work assignments is marked and strong. Large numbers of certificate personnel (but not necessarily the majority) end up working in particular fields and become effectively specialized. This may indicate that some mild degree of specialization beyond crops and livestock/animal health is required to satisfy the real needs of the end users. The pattern of specializations uncovered in the unconstrained demand projections could provide a guide as to the proportions which would be more responsive to the various organization units.

Second, at the diploma and above levels, the indications are that staff do generally staffwithin their field of training. The major exceptions are those specialists who are selected to become primarily administrators of headquarters and field offices.

f. Staff in Training Status

Of the 5,356 filled posts in the sector, a certain number will always be on some form of training or service. For example, at the time of the survey many staff were in national service, attending in-service training, or off on a short course. Thus, the actual strength of the sector's personnel is normally well below the number of filled posts. For example, a rough estimate of personnel away from the job-site in 1979 would include the following:

Certificate Staff on Diploma In-Service Training	=	500
Diploma Staff on B.Sc. Training by Mature Entry	=	90
Staff on Overseas Training at B.Sc., PGD, M.Sc. & Ph.D.	=	137
		727

These 727 persons in training status represent about 14% of the 5,356 total personnel complement. Such staff are unavailable to implement current work programs and projects. They are an investment in the future at considerable real cost to existing efforts; and the remaining staff necessarily have to absorb part of the workloads left behind.

Unfortunately, due to a questionnaire design shortcoming, the number of staff shown as in training status in Exhibit III-F was underrecorded. Respondents gave the principal work assignments of their personnel, whether they were on training or not; and interviewers were not able to record training status on the survey form with all the accuracy it deserves.

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FILE NEWAM (CREATION DATE = 02/01/80)

* * * * * * * * * * * * * * * * * * * CROSSTABULATION OF * * * * * * * * * * * * * * * * * * *
SPECGRPS SPECIALTY GROUPS BY EDLEVEL EDUCATION LEVEL
CONTROLLING FOR..
PERIOD FILLED POSTS-UNCONSTRAINED DEMAND VALUE = 1. FILLED POSTS 79
* PAGE 1 OF 2

COUNT / EDLEVEL	1. MERIT	2. CERTIFICATE	3. DIPLOMA	4. B.SC.	5. PGD	6. MASTERS	7. PH.D.	ROW TOTAL
SPECGRPS								
1. CROPS-GENERAL	43	1363	321	282	6	18	5	2038
								38.1
2. CROP BREEDING	2	7	0	5	1	1	2	18
								0.3
3. CROP PROTECTION	24	28	8	9	0	12	1	82
								1.5
4. HORTICULTURE	5	39	39	4	0	8	1	88
								1.6
5. SOIL SCIENCE	0	18	13	27	0	16	4	78
								1.5
6. ANIMAL SCI-GENL	6	255	159	41	0	15	4	480
								9.0
7. ANIMAL HEALTH	13	439	61	1	0	0	0	514
								9.6
8. ANIMAL NUTRITION	0	0	0	0	0	3	1	4
								0.1
9. ANIMAL BREEDING	0	21	6	4	1	3	1	36
								0.7
10. RANGE PASTUREMGT	2	6	14	6	2	1	1	32
								0.6
11. HIDES AND MEAT	6	32	14	0	0	0	0	52
								1.0
COLUMN TOTAL	162	2909	1366	708	35	143	33	5356
	3.0	54.3	25.5	13.2	0.7	2.7	0.6	100.0

(CONTINUED)

Exhibit III-F

Current Assignments of Personnel by Specialty Groups and Educational Level, for Filled Posts 1979

Page 1

FILE NONAME (CREATION DATE = 02/01/80)

* * * * * * * * * * * * * * * * * * C R O S S T A B U L A T I O N O F * * * * * * * * * * * * * * * * * *

SPECGRPS SPECIALTY GROUPS BY EDLEVEL EDUCATION LEVEL

CONTROLLING FOR..

PERIOD FILLED POSTS-UNCONSTRAINED DEMAND VALUE = 1. FILLED POSTS 79

* PAGE 2 OF 2

EDLEVEL / COUNT / SPECGRPS	INERIT 1.	CERTIFICATE 2.	DIPLOMA 3.	B.SC. 4.	PGD 5.	MASTERS 6.	PH.D. 7.	ROW TOTAL
12. VET SCI-GENERAL	1	0	7	67	12	5	0	92 1.7
13. TECH SPECIALTIES	2	0	1	9	2	7	4	25 0.5
14. AGRIC ECONOMICS	7	131	301	51	0	22	4	516 9.6
15. AG ENGINEERING	0	14	67	11	1	4	1	98 1.8
16. IRRIGATION	3	42	34	28	3	3	0	113 2.1
17. HOME EC-FOOD SCI	16	46	43	1	0	0	0	106 2.0
18. AGRIC EXTENSION	29	135	76	32	3	1	0	276 5.2
19. AGRIC EDUCATION	0	13	8	15	2	6	0	44 0.8
20. TRAINING STATUS	0	161	13	21	0	2	0	197 3.7
21. RESEARCH	0	9	13	9	2	8	3	44 0.8
22. MISCELLANEOUS	3	150	168	85	0	16	1	423 7.9
COLUMN TOTAL	162 3.0	2909 54.3	1366 25.5	708 13.2	35 0.7	143 2.7	33 0.6	5356 100.0

III-F

Current Assignments of Personnel by Specialty Groups and Educational Level: for Filled Posts 1980

Page 2

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TANZANIA AGRICULTURAL MANPOWER SURVEY - 1979 02/07/80 PAGE 16

FILE NONAME (CREATION DATE = 02/07/80)

* * * * * * * * * * * * * * * * * * * CROSSTABULATION OF * * * * * * * * * * * * * * * * * * *
SPECGRPS SPECIALITY GROUPS BY EDLEVEL EDUCATION LEVEL
* PAGE 1 OF 2

SPECGRPS / COUNT	EDLEVEL 1.0 MERIT	2.0 CERTIFICATE	3.0 DIPLOMA	4.0 B.SC.	5.0 PGD	6.0 MASTERS	7.0 PGD-MSC-PH.D.	ROW TOTAL
1. CROPS-GENERAL	47	1703	362	385	5	19	5	2526
								47.2
2. CROP BREEDING	2	3	0	0	1	4	2	12
								0.2
3. CROP PROTECTION	19	17	6	4	1	14	1	62
								1.2
4. HORTICULTURE	4	15	47	6	0	1	1	74
								1.4
5. SOIL SCIENCE	0	1	1	23	0	13	4	42
								0.8
6. ANIMAL SCI-GENL	6	262	161	56	1	18	3	507
								9.5
7. ANIMAL HEALTH	13	556	120	1	0	0	0	690
								12.9
8. ANIMAL NUTRITION	0	0	0	0	0	3	1	4
								0.1
9. ANIMAL BREEDING	0	10	5	1	0	4	2	22
								0.4
10. RANGE PASTUREMGT	0	5	19	6	1	3	1	35
								0.7
11. HIDES AND MEAT	6	16	19	0	0	0	0	41
								0.8
COLUMN TOTAL	162	2911	1364	708	35	143	33	5356
	3.0	54.4	25.5	13.2	0.7	2.7	0.6	100.0

(CONTINUED)

III-G

Areas of Original Training for Filled Post 1979 Staff, by Specialty Group and Educational Level

Page 1

FILE NONAME (CREATION DATE = 02/07/80)

* * * * * * * * * * * * * * * * * * * C R O S S T A B U L A T I O N O F * * * * * * * * * * * * * * * * * * *

SPECGRPS SPECIALTY GROUPS BY EDLEVEL EDUCATION LEVEL

III -G

Areas of Original Training for Filled Post 1979 Staff, by Speialty Grup and Educational Level

Page 2

SPECGRPS / EDLEVEL (COUNT)	IMERIT 1.	CERTIFICATE 2.	DIPLOMA 3.	B.SC. 4.	PGD 5.	MASTERS 6.	PGD-MSC-PH.D. 7.	ROW TOTAL
12. VET SCI-GENERAL	1	0	7	82	17	6	0	113 2.1
13. TECH SPECIALTIES	0	0	0	1	2	9	4	16 0.3
14. AGRIC ECONOMICS	9	119	155	52	1	24	2	362 6.8
15. AG ENGINEERING	0	10	88	20	1	5	1	125 2.3
16. IRRIGATION	1	36	39	28	3	3	0	110 2.1
17. HOME EC-FOOD SCI	16	84	70	5	0	2	0	177 3.3
18. AGRIC EXTENSION	24	24	7	0	0	1	0	56 1.0
19. AGRIC EDUCATION	0	9	222	17	2	9	2	261 4.9
20. TRAINING STATUS	0	9	0	1	0	0	0	10 0.2
21. RESEARCH	7	8	22	11	0	5	4	57 1.1
22. MISCELLANEOUS	7	24	14	9	0	0	0	54 1.0
COLUMN TOTAL	162 3.0	2911 54.4	1364 25.5	708 13.2	35 0.7	143 2.7	33 0.6	5356 100.0

g. Non-Citizen Personnel: Contract and Technical Assistance Staff

There are two principal categories of non-citizens working in the agricultural sector. There are those that are employed under contract with Government and are serving in authorized establishment posts for a specified period of time; and those who are employed under aided projects by donor agencies on technical assistance assignments.

The survey enumerated 130 expatriates employed under contract in established posts. Expatriates on technical assistance projects were also enumerated in the survey. This was done to determine how many Tanzanian professional and technical staff would be required to replace some of them, and at what point in time. The major significance of these posts is that they are not presently on establishment, and therefore add to the total demand for manpower. In the course of implementing some projects for which Tanzanian replacements were not originally thought to be required, it was discovered that it would be very desirable indeed to continue with a person in the work. The survey identified 81 out of 147 technical assistance positions which respondents indicated should have Tanzanian staff during the 1979-81 period. All were professional level officers. These numbers do not double count those positions for which counterpart replacements have already been arranged in the assistance agreement.

In summary, there are the following non-citizens working in the agricultural sector who will require replacement with Tanzanian staff.

		Total	Replacements Required
Non-Citizens on Establishment	=	130	130
Technical Assistance Staff Not on Establishment	=	147	81
		277	211

B. Turnover and Attrition

Turnover and attrition data were collected for two reasons. With regard to turnover, it is useful to have a grasp on the number of transfers-in and -out taking place within a sector and its component organizations. This factor may help to explain problems of efficiency and effectiveness. Such issues are taken up in the utilization chapter, although the base data is presented here.

Attrition information plays a critical role in quantitative supply and demand analysis for educational planning purposes. It indicates the approximate annual losses of personnel being experienced due to death, retirement, dismissal, and resignation. Each of these were defined as persons leaving the field of salaried agricultural employment entirely. These are distinguished from persons merely transfering from one organization or geographic area to another.

Unfortunately, personnel records on transfers and attrition are not kept in a form which permits rapid and easy access and computation. For this reason the survey team decided to ask respondent supervisory managers to recall their turnover and attrition figures for only the 1978/79 financial year. In this way it was felt that a useful rough estimate based on personal knowledge of events could be evolved for 283 diverse situations. It appeared this would be the best that could be achieved; and that the figures would be sufficiently reliable for the types of calculations for which they would be utilized.

1. Attrition

The losses to the agricultural sector are summarized in Exhibit III-H. Total sectoral attrition is shown, as well as that for each organization type and educational level. If 1979 is reasonably indicative of an average year's attrition, then the overall losses in the sector do not appear terribly worrisome.

- Certificate attrition = av. 2.3% per year
- Diploma attrition = av. 3.0% per year
- B.Sc. and above attrition = av. 3.9% per year

These appear to be within normal bounds for organizations whose members are relatively youthful in age structure.

Exhibit III-H

Attrition Rates by Educational Levels and Organization Types for Agricultural Sector Filled Posts 1979

	Certificate[1]			Diploma			BSc-PGD-MSc-PhD		
	Attri-tion 1979	FP79	%	Attri-tion 1979	FP79	%	Attri-tion 1979	FP79	%
1. PMO - Regions and Districts	40	1925	2%	25	499	5%	8	160	5%
2. Parastatals	26	529	4.9%	5	269	1.9%	9	261	3.4%
3. Research Institutes	1	338	0.3%	4	154	2.6%	12	188	6.4%
4. MOA - Hdqtrs & Field Stations	1	60	1.7%	5	35	14.3%	4	88	4.5%
5. Other Ministries	0	65	0	1	237	0.4%	2	16	12.5%
6. Private Sector	1	15	6.6%	1	8	12.5%	1	12	8.3%
7. UDSM-Fac Ag/Vet	2	9	22.2%	0	6	0	0	94	0
8. MATIs	0	130	0	0	158	0	0	100	0
9. Attrition Rates	71	3071	2.3%	41	1366	3.0%	36	919	3.9%

Notes: 1. Certificate Filled Posts 1979 include Merit Level personnel

Attrition will normally be greater at higher education levels because of a number of factors. The most important are probably:

- retirement age being approached by more senior staff in the organization
- opportunities for career advancement by more highly qualified specialists both domestically and internationally
- opportunities for higher remuneration for researchers in other research or non-research organizations outside the Ministry institute system
- other idiosyncratic personal and professional reasons.

The significant attrition statistics are those which relate to larger numbers of personnel in each educational level. For example, although Other Ministries have a 12.5% attrition rate for B.Sc. and above staff, only 2 out of 16 personnel were lost. By contrast, at the diploma level, where there are 237 persons teaching, the attrition was only 0.4%. Similarly, the private sector attrition percentages may look high, but the small numbers involved tend to overaccentuate the situation.

One special area of concern is the apparently sizable 6.4% attrition at the research institutes for B.Sc. and above level staff. Twelve out of 188 scarce researchers were lost, and this may indicate a major problem. Such a rate of attrition could have significant adverse impact in an area in which the development of experience and continuity of effort are critical. Combined with the turnover frequency discussed in the next section, this 6.4% rate naturally deserves closer scrutiny than this broad sectoral analysis can give.

2. Turnover

Exhibit III-I describes two measures of intra-sectoral personnel movements in 1979. These are the incidence of transfers-in and transfers-out and the net changes and flows among the 283 organization units in the survey. These transfers do not include new allocations of staff from training institutions. The relative accuracy of the responses given may well be indicated by the fact that incoming and outgoing staff movements from 283 scattered respondents are within 5 digits of one another. The discrepancy is only about 1.7%, from 292 to 297.

The high incidence of transfers which tend to cause disruptions of productivity in both the departed and receiving organizations is naturally a matter of concern. The 16% and 17% disruption rates in the regions and districts, and the Ministry of Agriculture (respectively), are understandable, though naturally not desirable. Persons stationed in rural areas often wish to move for a variety of personal and work-related reasons. Situations are constantly arising in a complex political and governmental structure dealing with agriculture which necessitate shifting personnel more often than would be wished. Many persons also perceive that it is only by moving geographically towards headquarters offices and the capital city that they can give themselves the best opportunities of advancing their careers. Thus, social and psychological motivations also play their role, along with personal and economic ones.

As mentioned just previosuly, the research institutes provide the most troubling note in these statistics. The movement rate is 10% of total staff per year, involving 69 out of 680 persons. As the table shows, transfers out of research institutes number 47, while transfers-in are only 22. The net change of minus 25, is a transfer loss of -8.6%. This is the highest negative change of any organizational type. Taken together with the high attrition rate, these may well be discouraging indicators for the performenace of research functions.

Exhibit III-I

Incidence of Transfers and Net Change Measures
by Organization Type, for 1979

		(1) Transfers		(3) Net Change	(4)	(5)	+	(6)	=	(7)
						Transfer		Disruption		Incidence
		+ In	- Out	Net of Columns (1) - (2)	% of Total Trfr Out[1]	Total In Out. (1) + (2)		Filled Posts 79		% of Filled Posts 79
1.	Research Institutes	22	-47	-25	-8.6%	69		680		10%
2.	PMO - Regions/District	194	-208	-14	-4.8%	402		2584		16%
3.	Parastatals	47	-23	+24	+8.0%	70		1059		6%
4.	MOA - Hdqtrs/Field Sts	20	-12	+ 8	+2.7%	32		183		17%
5.	Private Sector	7	0	+ 7	+2.4%	7		35		20%
6.	UDSM - Faculty Ag/Vet	6	-2	+ 4	+1.3%	8		109		7%
7.	Other Ministries	1	0	+ 1	+0.3%	1		318		0.3%
8.	MATIs	-	-	-	-	-		388		-
	Totals	297	292			589	+	5356		11%

Notes: 1. Column 4 = Column 3 Divided By 292 (Sum of Column 2)

C. Unconstrained Demand

The survey was designed to answer the question: how many persons are needed over the next seven years, at each educational level and in which specializations? As related in the chapter on methodology, the basic approach was to ask an unconstrained manpower demand question. This question asked for the personal professional opinion of each supervisory manager without regard to budgetary, policy, or any other constraints. It requested an assessment of how many persons could be effectively utilized in the respondent's area of responsibility.

Immediately preceding this question on the survey form was a series of seven inquiries about agricultural development in the respondent's area of responsibility. The subjects were: the numbers of villages and people, the service ratios of staff to farm households, the activities which should be expanded or improved, the possibility of initiating new projects, and other factors which influence manpower demand. Significant time was spent in the interviews on these inquiries. The purpose was twofold. First, it was to ensure that respondents had reasoned and recorded bases for giving their estimated needs. Second, it was to stimulate respondents to consider comprehensively the varied activities which would require manpower in the future, so that important fields were not left out due to oversight.

It was well known that asking an unconstrained question would elicit requests for additional personnel which could not be satisfied for many, many years. The study team and respondents were fully aware that a budget constraint exists; and that the ability to produce additional new personnel is also tightly limited by the availability of Forms IV and VI graduates to enter agricultural training.

However, the unconstrained demand question yields a number of important pieces of information about the need for agriculturally trained personnel.

- For each individual end user, it gives a picture of where the organization is now, and where it needs to go in satisfying its demand. In the future, when even new supervisory managers are asked what the priority staff needs are for his/her organization unit, they will possess a comprehensive list from amongst which to make a rational choice.

- For central manpower and educational planners, the aggregate information specifies how many persons are wanted in which specialization at which qualification level. This information is more reliable than they have had before; and they can proceed to design and build the size, kind, and level of training institutions needed by diverse end users throughout the sector.

- For regional and central manpower allocators, it can assist with more finely targeted placement of specialists who are being graduated or who have just returned from overseas programs.

- For all end users, it provides a set of statistical table formats which can be regularly, cheaply, and easily updated as time and circumstances change.

- For financial planners, the information provides a known scientific basis for manpower projections and their justifications.

1. Respondents' Explanation of Demand Projections

There were a number of major rationales given for the projections made. The study team was impressed by the complex and well-thought out bases of judgement given. A large array of factors were taken into consideration by respondents. The main ones appeared to be:

- Depending on population density, the size and topography of the area, and ease and availability of communications, roads, and vehicles between villages, supervisory managers would calculate whether or not a single extension agent could cover only one or possibly two or more villages. Most managers tended to think that one agent for one village was in fact desirable; and this was especially true for drier land areas where distances become a major issue. They would then calculate the gap between existing village contact staff and the number of villages. Many took into consideration in and out-migration from their wards, as well as the fact of overcrowded villages that would have to be sub-divided in the next plan period.

- As will be noted in greater detail in the utilization section, livestock personnel felt almost unanimously that their certificate level staff should receive specialized training. This naturally had a major effect on the numbers asked for. While crops staff did not feel as strongly as livestock professionals, they too preferred the specialized approach.

- The major crop and livestock problems which require urgent attention, the major development opportunities which the managers perceived as existing in their areas, and the major scheduled efforts known, were the source of most requests for specialized personnel at all levels. These were often based on very detailed workload calculations involving the number of dips to be supervised, and so forth.

- The number of diploma and B.Sc. level supervisors needed, where they should be stationed, and their subject matter specialties provided another set of projection factors. In addition, the volume of routine office work which a district or regional office faced, often figured in the calculations of managers.

From the survey experience the study team gained full confidence in the well-supported unconstrained demand projections. In the underlying technical, programmatic, and organizational analyses, the level of professional sophistication shown was very considerable. This was true regardless of respondents' formal educational qualifications. At no time did the team members feel that respondents were over-estimating. There were occasions when inquiries were made about possibly over-conservative projections. There were in all cases well-thought out answers which highlighted the local characteristics of the manager's area situation. All managers seemed fully aware of the financial implications and this kept them prudently conservative. Lastly, they were able to appreciate the utility of the unconstrained demand question approach, in full recognition that budgetary and manpower availability constraints would be applied subsequently. Their motivation, however, was high for contributing to the planning of the agricultural education system on a fully professional basis.

2. Projections of Unconstrained Demand

Exhibit III-J presents a summary by educational level of the present filled posts, the 1980-1986 demand, and the resulting "ideal" staffing pattern for 1987. These are broken down by each of the main organization types. The grand totals are:

Filled Posts 1979	5,356
Unconstrained Demand 1980-86	+20,052
Ideal Staffing Pattern	25,408

These gross figures indicate that the supervisory management staff believe that filled posts should ideally grow by 374% over the next seven years. They believe these numbers of personnel could be effectively utilized in the pursuit of agricultural development objectives (if salaries and other operating costs could be afforded).

As the table shows (Exhibit III-J), the organizations which most feel the staff needs are the PMO's regions and districts (+608%), the parastatals (+214%), and the other ministries (+285%). The first two loom large because of their extensive involvement with extension and farm management operations; while the other ministries carry on considerable teaching activities and farm management.

Ministry of Agriculture (MOA) headquarters and field stations (+121%) and research institutes (+144%) do not show anywhere near as large demand estimates. This is due to the nature of their work as primarily headquarters planning and support and specialized researcher units. The major contrast with the PMO, parastatals, and other ministries organizations is with regard to educational levels. The MOA and the research institutes naturally require higher level manpower, with increases for already sizable M.Sc. level staff running from 414% to 442%.

The private sector demand is numerically small. Training institute and university demand are not projected yet. This is because their staffing numbers could not be estimated until policy decisions have been taken about the numbers of students who will be allocated to agricultural training.

When the total demand is summarized by each organization type and compared with the proportions of staff for 1979 and the resulting 1987 projections, Exhibit III-K shows the configuration.

Exhibit III-J

Filled Posts, Unconstrained Demand, and Ideal Staffing Pattern by Organization Type, Educational Level, and Period

Organization Type	Filled Posts 1979	80-81 Demand	82-83 Demand	84-86 Demand	Ideal Staffing Pattern 1987	Percent Increase 1979-87
MOA-Hdqtrs/Field Sts						
Certificate	60	30	5	0	95	58%
Diploma	35	34	11	12	92	163%
B.Sc.	59	25	31	11	126	114%
P.G.D.	12	-	-	-	12	-
M.Sc.	14	27	20	11	72	414%
Ph.D.	3	0	3	1	7	133%
	183	116	70	35	404	121%
Research Institutes						
Merit	48	-	-	-	48	-
Certificate	290	217	210	27	744	57%
Diploma	154	108	142	17	421	173%
B.Sc.	142	72	15	10	239	68%
P.G.D.	9	-	-	-	9	-
M.Sc.	33	22	118	6	179	442%
Ph.D.	4	4	10	4	22	450%
	680	423	495	64	1662	144%
Training Institutes						
Certificate	130					
Diploma	158					
B.Sc.	83	(Depends on student intake numbers chosen)				
M.Sc.	16					
Ph.D.	1					
	388				388+	
PMO-Regions/Districts						
Merit	82	-	-	-	82	-
Certificate	1843	4733	3310	3049	12,935	602%
Diploma	499	1505	1067	1087	4,158	733%
B.Sc.	144	341	223	199	907	530%
P.G.D.	8	-	-	-	8	-
M.Sc.	8	55	61	55	179	214%
Ph.D.	0	0	0	5	5	500%
	2584	6634	4661	4395	18,219	605%
Other Ministries						
Certificate	65	136	138	110	449	591%
Diploma	237	87	103	45	472	99%
B.Sc.	14	65	43	53	175	150%
M.Sc.	2	3	13	5	23	1000%
	318	291	297	213	1119	285%

Organization Type	Filled Posts 1979	80-81 Demand	82-83 Demand	84-86 Demand	Ideal Staffing Pattern 1987	Percent Increase 1979-87
IMSM-Faculty Ag/Vet						
.tificate	9					
Diploma	6					
B.Sc.	28	(Depends on student				
M.Sc.	43	intake numbers chosen.)				
Ph.D.	23					
	109				109+	
Parastatals						
Merit	32	-	-	-	32	-
Certificate	497	626	320	365	1808	264%
Diploma	269	249	158	141	817	204%
B.Sc.	227	156	104	107	594	162%
P.G.D.	5	-	-	-	5	-
M.Sc.	27	34	21	14	96	256%
Ph.D.	2	13	6	12	33	1550%
	1059	1078	609	639	3385	214%
Private Sector						
Certificate	15	20	0	0	35	
Diploma	8	5	0	0	13	
B.Sc.	11	3	2	2	18	
P.G.D.	1	-	-	-	1	
	35	28	2	2	67	91%
Grand Total						
Merit	162	-	-	-	162	-
Certificate	2909	5762	3983	3551	16,205	457%
Diploma	1366	1988	1481	1302	6,137	349%
B.Sc.	708	662	418	382	2,170	206%
P.G.D.	35	-	-	-	35	-
M.Sc.	143	141	233	91	608	325%
Ph.D.	33	17	19	22	91	176%
	5356	8570	6134	5348	25,408	

Exhibit III-K

Comparison of Existing, Requested, and Ideal Staffing Proportions by Organization Type[1]

	Filled Posts 1979	Unconstrained Demand 1980-86	Ideal Staffing Pattern
1. PMO-Regions/Districts	48.2%	78.2%	71.9%
2. Parastatals	19.8%	11.6%	13.3%
3. Research Institutes	12.7%	4.9%	6.5%
4. Other Ministries	5.9%	4.0%	4.4%
5. MOA-Hdqtrs/Field Stations	3.4%	1.1%	1.6%
6. Private Sector	.7%	.2%	.3%
7. Training Institutes	7.2%	-	1.5%+
8. UDSM-Faculty Ag/Vet Sci	2.0%	-	.4%+
	100.0%	100.0%	100.0%

Note: 1. Derived from Exhibits III-A and III-P

The dominance of the regions and districts as sources of employment for agriculturalists is most evident. The unconstrained demand requests reflect the serious shortage of personnel to fully cover all of the villages. This is so overwhelming that the ideal staffing pattern would make the other organizations appear significantly reduced in proportions. But this is only a relative comparison, and not an absolute one.

a. Educational Level Demand

Extension operations naturally require the greatest numbers of certificate level staff to be in contact with farmers. An increase in their numbers requires an increase in the number of field supervisors and subject matter specialists at diploma and B.Sc. levels. In addition, because of the field experience and educational backgrounds of diploma personnel this level appears to be in relatively greater demand than any other category including even certificates for many organizations. The PMO is the largest user of agricultural personnel, with 2,584 or 48% of the total. Its regions and districts project a diploma demand increase of 733%, which outdistances the +602% for certificates.

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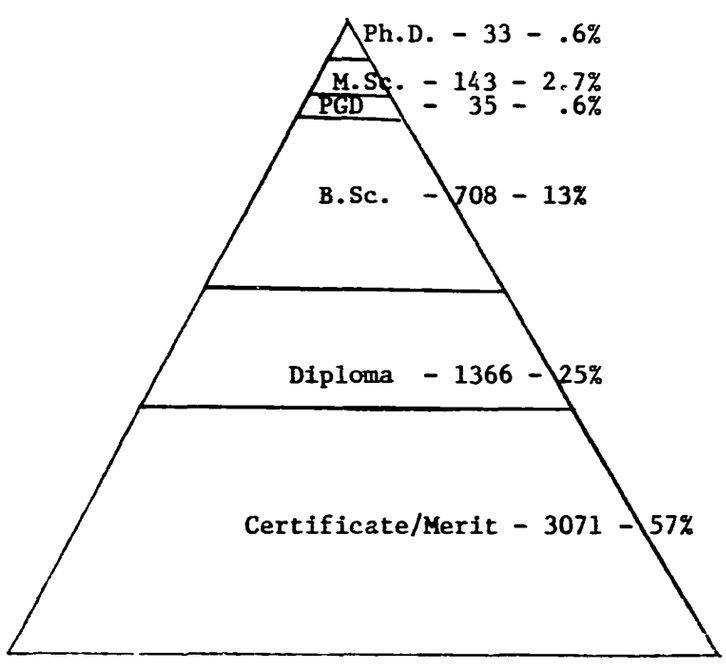
Exhibit II- ..

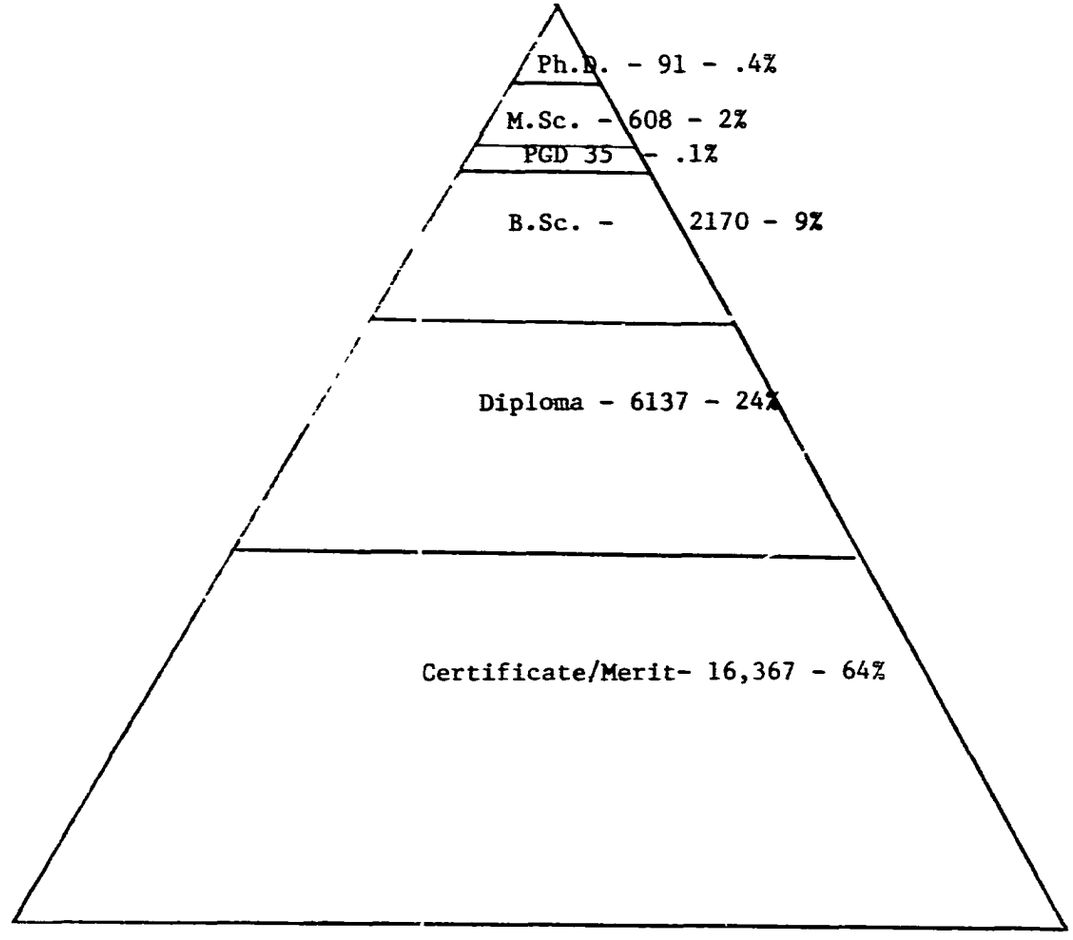
Agricultural Sector

Comparison of 1979 Staffing Pattern with Survey Respondents' 1987 Ideal Pattern



1979 Staffing Pattern - 5,356

Sub-Technical Cadres - (3,996)



1987 Ideal Staffing Pattern - 25,408

Sub-Technical Cadres - (est. 2,600)

When analysis of educational level patterns over time is made, there is a significant shift to be noted. Exhibit III-M depicts the percentage of personnel at each educational level in 1979, the total requested for 1980-86, and the ideal staffing pattern for 1987. End users would like to make major shifts in the proportions of personnel at certificate, B.Sc., and higher degree levels.

Exhibit III-M

Educational Level Proportions for Filled Posts, Unconstrained Demand, and Ideal Staffing Pattern

Educational Level	Filled Posts 1979 %		Unconstrained Demand 1980-86 %		Ideal Staffing Pattern 1987 %		Net Change
Merit/Certificate	54.6%		66.3%		64.3%		+9.7
Diploma	25.5%		23.8%		24.1%		-1.4
B.Sc.	13.2%		7.3%		8.5%		-4.7
PGD	.7%		0		0.13%		
M.Sc.	2.7%	4%	2.3%	2.6%	2.3%	2.78%	-1.2
Ph.D.	.6%		0.3%		.35%		

Note: Exhibit III-M derived from Exhibit III-J figures.

As the net change column above reflects, the alteration in staff proportions over the 1980-86 period would ideally mean a growth in certificate level staff, and a relative decline in all higher levels. Essentially the major move would be an increase in the proportion of certificate level staff from 55% to 64%, which once again reflects the vast number of villages which are uncovered by extension services. This is a substantial change when dealing with thousands of personnel.

c. Staffing Proportions and Service Ratios: Existing and Projected Ideal Patterns

Unfortunately, staffing patterns cannot normally be made meaningful apart from the functions performed and people served. It is therefore useful to combine the preceding educational level proportions data with the extension agent service ratios concept.

In this way it should be possible to see the implication of the projections for the performance of particular activities. In addition, these service ratios can be compared with those of other countries to reality-test the information given.

In the present case, the staffing proportions will be presented in two forms. The first form will consider only the proportion of B.Sc. and higher degree staff to diploma and to certificate staff, for both the existing and projected figures. The second form will include 3,996 auxillary/attendant sub-technical cadres in with the certificate level staff. The rationale for this is that in considering service ratios of extension agents to farm households, the total "contact agents" available should be considered. These figures can then be compared with data collected in 1977 from a study in Kenya.

Exhibit III-N demonstrates that supervisory managers ideally wish to see a change from the present proportion to another configuration.

Exhibit III-N

Staffing Proportions for Agricultural Sector Staff
With and Without Inclusion of Sub-Technical Cadres

	B.Sc. & Above Staff		Diploma		Certificate		Combined Certificate and Sub-Technical
Filled Posts 1979	919		1,366		3,071	or	7,067
Staffing Proportions	1	:	1.5	:	3.3	or	7.7
Projected Ideal Staff	2,904		6,137		16,367	or	18,967
Staffing Proportions	1	:	2.1	:	5.6	or	6.5

The need to increase diploma staff is noticeable (from 1.5 to 2.1), just as it was in the earlier figures. The significance of the contribution made by the 3,996 persons in the sub-technical cadres to the 1979 staffing situation is properly emphasized in the change in the ratio from 3.3 to 7.7. Without considering auxillary/attendant staff, the "available personnel" picture is seriously distorted; and looks more depressing than it needs to appear.

The present service ratio when only certificate staff are counted is 1,222 farm households to one extension agent. When sub-technical staff are included, the ratio becomes 465 farm households to one contact agent.

The 1987 ratios are 256:1 when certificate staff only are counted; and 218:1 when sub-technical level agents are included. Exhibit III-O depicts these ratios, and their derivation.

Exhibit III-O

Service Ratios for Extension Contact Agents:
Regional, District and Parastatal Staffs Only

	Only Cert. Staff	Farm House-holds	Ratio	OR	Combined Certif. & Sub-Tech. Staff	Farm House-holds	Ratio
Existing Ratios 1979	2,454[1]	3.0mil[2]	1,222:1	OR	6,450[3]	3.0mil	465:1
Ideal Ratios	14,857[4]	3.8mil[5]	256:1	OR	17,457[6]	3.8mil	218:1

Notes: 1. Certificate and equivalent merit staff total 3071 for the agricultural sector as a whole. Of these 3071, approximately 2454 are employed by regional, district and parastatal organizations involved in extension service functions.

2. World Bank estimate of farm households in 1974 was 2.4 million, which at 3.3% per annum population growth rate would mean 2.8 million in 1979. USAID Mission estimates 3.2 million holdings in 1979.

3. The combined total of 6450 equals 2454 plus 3996 persons in the sub-technical cadre.

4. 1987 certificate staff equal 2454 present staff plus all projected certificate needs for 1980-86. See Exhibit III-J.

5. Farm households 1987 equals 1979 figure of 3.0 mil projected at 3.3% per annum population growth rate.

6. The combined total of 17,457 equals the 14,857 certificates needed from 1980-86, plus the remaining unreplaced sub-technical cadre of 2600 persons after attrition has reduced it from 3996, at about 5% per year.

There appears to be a good deal of professional sense behind the low ratios which supervisory managers have projected. Their intuitive and calculated estimates for how many agents it would take to equitably and effectively cover all the farm households in their areas at one time is likely to be valid. It is borne out by actual service ratios in the design of many intensive area development projects. Examination of projects which have attempted to make major impacts on farming systems in a number of places have often structured service ratios as low as 50 to 1, in the first year or so; and

then enlarged the ratios as frequency of communications and guidance became less necessary.

Thus, the projected lowering of Tanzanian ratios from 465 to 218 :1 cannot be considered out-or-order from a professional point of view. Similarly, it is reassuring to see that neighboring Kenyan agriculturalists presently have achieved a 127:1 ratio; and requested that it be lowered to 92:1. Budget constraints made a reduction to 121:1 the feasible objective, in their case. These figures are shown in Exhibit III-P, for comparative purposes only.

Exhibit III-P

Kenya Ministry of Agriculture
Extension Contact Agent Ratios[1]

	Staff[2]	Farm Households	Ratio
Filled Post 1977	10,240	1,300,000	127 : 1
1983 Unconstrained Dem.	17,433	1,600,000	92 : 1
1983 Budget Constrained Demand	13,250	1,600,000	121 : 1

Notes: 1. Brown, A.L., K. Hecht, R. J. Simmons, et. al., Report: Professional and Sub-Professional Agricultural Manpower in Kenya (Demand, Supply, Education, and Utilization), American Technical Assistance Center, General Research Corporation, McLean, Virginia: March, 1978, p.23.

2. Staff equals both junior technical assistants (sub-technical cadres) and technical assistants (certificate level).

D. Specializations Demand

The survey requested respondents to break down their unconstrained demand projections for each educational level and period into one of approximately 160 agricultural specializations. These were in turn categorized into 21 specialty groups comprising the broader fields of work and study. The computer print-out appendices document the detailed numbers and specializations. Information on every organizational end user responding to the survey is available with cross-tabulations by educational level and period in which the staff are wanted.

Given these figures it should be possible for central manpower planners to adjust the production of personnel more closely to the proportions in which each is needed. Staff going overseas can be given specific alternatives as to specializations and major and minor emphases which they should cover in their university courses. Donors who inquire what fields of study are needed can be given a comprehensive picture; and returnees can be placed in those organizations that requested them.

Caution should be exercised with regard to one important point. These figures express the personal professional views of the principal supervisory managers of end user organizations. In the main, they are probably the most sound and reliable indicators of actual needs in the country. However, these views reflect the needs of only individual areas, specializations, and organizations. They do not necessarily reflect which specializations should receive priority in sequence and proportion of educational investment. They cannot adequately substitute for a national judgement that considers which particular specialty fields at which educational levels of which organizations will be most helpful in forwarding an integrated agricultural development strategy. Within the context of national goals and needs, the information provided in this survey can help to arrive at a more fully informed decision. As the manpower production guidelines and utilizations chapters will argue somewhat further on, the sequence of investments in educational specializations may require that certain organizations and educational levels receive precedence; and that such choices would be more likely to lead to rapid and equitable development.

Equal care must be taken in interpreting figures, so that the size of requests for additional personnel are not mistaken for the relative importance of certain needs. For example, the great numbers of persons ideally wanted at certificate level does not necessarily mean that the certificate level is the most important level of manpower production to be accelerated. Nor do the sizable numbers of persons in the crops and livestock areas mean that one can afford to ignore the much smaller requests in other areas. Amongst those specializations with very much smaller demand may be those which are more crucial to agricultural development at a certain point in time than even thousands of general crops field agents. Crop breeders, planners and analysts may be examples of even higher priority fields.

1. Summaries of Specializations Needed by Educational Level

In Exhibit III-Q the existing pattern of deployment on principal work assignments is compared with the unconstrained demand proportions by specializations for each educational level. The unconstrained demand proportions probably represent the best general guideline for structuring curriculum emphases for each entering class in the future.

Any contrast between present work assignments and unconstrained demand has nothing to do with relative importance of each field. Rather, increases or decreases in percentage proportions reflect relative scarcity or sufficiency of staff in a particular field. Decreases in percentage figures between work assignments and unconstrained demand in any one specialty area do not mean decreases in the absolute numbers of staff. They may mean that one area has received relatively greater attention in the past, and that the particular specialty is relatively in less need than some other specialties in terms of educational planning for the future.

For example, specialty group number 10, range/pasture management, contains higher percentages of unconstrained demand than present principal work assignments in every educational level except that of Ph.D.. This probably reflects a clear need for a

Exhibit III-Q

Summary Proportions Comparison: Principal Work Assignments of Existing Staff with Unconstrained Demand, in Percentages, by Specialization Groups and Educational Level

	Specialty Groups	Certificate		Diploma		B.Sc.		M.Sc.		Ph.D.	
		Princ. Work Assignment	Unconstrained Demand	PWA	UCD	PWA	UCD	PWA	UCD	PWA	UCD
1.	Crops - General	46.9	55.8	23.5	26.2	39.8	39.9	12.6	18.5	15.2	15.5
2.	Crop Breeding	2.0	0	0	0.3	0.7	0.8	0.7	2.2	6.1	10.3
3.	Crop Protection	1.0	1.5	0.6	1.1	1.3	2.1	8.4	3.7	3.0	6.9
4.	Horticulture	1.3	3.1	2.9	5.6	0.6	2.9	0	1.1	3.0	0
5.	Soil Science	0.6	0.6	1.0	0.4	3.8	1.3	11.2	3.2	12.1	6.9
	Crops-Sub-total:	51.8	61.0	28.0	33.6	36.2	37.0	32.9	28.7	39.4	39.6
6.	Animal Sci - General	8.8	8.6	11.6	15.4	5.8	6.8	10.5	10.8	12.1	8.6
7.	Animal Health	15.1	16.5	4.5	14.3	0.1	0.3	0	0.9	0	0
8.	Animal Nutrition	0	0	0	0.1	0	0.1	2.1	2.2	3.0	3.4
9.	Animal Breeding	0.7	1.1	0.4	1.2	0.6	0.4	2.1	1.5	3.0	0
10.	Range/Pasture Mgt.	0.2	0.8	1.0	2.5	0.8	1.6	0.7	3.9	3.0	0
11.	Hides/Meat	1.1	1.1	1.0	1.6	0	0.5	0	0.9	0	0
12.	Vet. Sci. - General	0	0	0.5	0.4	12.5	11.4	3.5	11.4	0	5.2
13.	Vet/Tech Specialties	0	0	0.1	0.2	1.2	8.6	4.9	8.6	12.1	12.1
	Livestock-Sub-total:	25.9	28.1	19.1	35.7	21.0	29.7	23.8	40.2	33.2	29.3
14.	Agric. Economics	4.5	4.9	22.0	11.8	12.0	9.9	15.4	9.9	12.1	3.5
15.	Agric. Engineering	0.5	1.9	4.9	6.2	5.2	3.2	2.8	3.2	3.0	5.2
16.	Irrigation	1.4	2.4	2.5	5.7	7.3	9.0	2.1	9.0	0	1.7
17.	Home Ec/Food Sci	1.6	1.5	3.1	6.0	2.5	3.0	0	3.0	0	15.5
18.-21.	Others*	16.0	0.3	20.5	8.1	22.9	2.5	23.1	6.2	12.1	5.1

* Others includes Agricultural Education, Agricultural Extension Administration, Persons on Training Status, Unspecified Research Specialties, Unspecified and Miscellaneous Categories

greater proportion of such personnel to be produced in the future in contrast with the past. In another livestock example, there appears to be relatively less need for B.Sc. level veterinary science graduates than in the past. However, there appear to be very large increases for personnel at the B.Sc. and M.Sc. level in the technical veterinary research specializations. This probably reflects the shortage of such research personnel at the livestock institutes, insufficient production of such personnel in the past, and the significant demand for them at present, relative to all other specialties.

Irrigation is another area where all educational levels require production of proportionately more personnel relative to their lower proportional levels in the current staffing pattern.

2. Specializations Needed by Organization Type

Exhibits III-R through III-W specify the proportions of personnel wanted by each of the major end user organization types, including regions and districts, Ministry of Agriculture headquarters and field stations, research institutes, other ministries, the parastatals and the private sector. The organization type perspective is important because the limited number of persons available for training at each level must naturally be shared amongst a variety of employing organizations. Sectoral manpower planners will be faced with allocating training slots to the various organizations and allocating the unsponsored personnel upon graduation. The manpower production guidelines and utilization aspects of manpower planning chapters address this question further on in the study. The priority may have to be given to certain end users over the desires of others, in order to address certain key issues in agricultural development.

FILE NO 15 (CREATION DATE = 05/12/80)

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SPECGRPS SPECIALTY GROUPS BY EDLEVEL EDUCATION LEVEL
CONTROLLING FOR..
ORGTYPE ORGANIZATION TYPE VALUE = 1. REGION- DISTRICT
* PAGE 1 OF

Exhibit III-R

Unconstrained Demand and Percent Proportions for Regions and Districts by Specialty Groups

(Page 1)

SPECGRPS (COUNT / COL PCT)	EDLEVEL: CERTIFICATE 2.	DIPLOMA 3.	B.SC. 4.	MASTERS 6.	PH.D. 7.	ROW TOTAL
1. CROPS-GENERAL	5760	719	224	43	2	6748
	51.9	19.7	29.4	25.1	40.0	43.0
2. CROP BREEDING	0	0	3	0	0	3
	0.0	0.0	0.4	0.0	0.0	0.0
3. CROP PROTECTION	151	30	23	3	0	207
	1.4	0.8	3.0	1.8	0.0	1.3
4. HORTICULTURE	343	238	23	4	0	608
	3.1	6.5	3.0	2.3	0.0	3.9
5. SOIL SCIENCE	6	4	5	0	0	15
	0.1	0.1	0.7	0.0	0.0	0.1
6. ANIMAL SCI-GENL	1049	649	72	32	0	1802
	9.5	17.7	9.4	18.7	0.0	11.5
7. ANIMAL HEALTH	2133	657	5	4	0	2799
	19.2	18.0	0.7	2.3	0.0	17.8
8. ANIMAL NUTRITION	0	2	1	1	0	4
	0.0	0.1	0.1	0.6	0.0	0.0
9. ANIMAL BREEDING	131	52	6	1	0	190
	1.2	1.4	0.8	0.6	0.0	1.2
10. RANGE PASTUREMGT	96	102	22	8	0	228
	0.9	2.8	2.9	4.7	0.0	1.5
11. HIDES AND MEAT	121	57	5	4	0	187
	1.1	1.6	0.7	2.3	0.0	1.2
COLUMN TOTAL	11092	3659	763	171	5	15690
	70.7	23.3	4.9	1.1	0.0	100.0

FILE NONA (CREATION DATE = 05/12/80)

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SPECGRPS SPECIALTY GROUPS BY EDLEVEL EDUCATION LEVEL
CONTROLLING FOR..
ORGTYPE ORGANIZATION TYPE VALUE = 1. REGION- DISTRICT
* PAGE 2

Exhibit III-R

(Page 2)

SPECGRPS (COUNT / COL PCT)	EDLEVEL: CERTIFICATE 2.	DIPLOMA 3.	B.SC. 4.	MASTERS 6.	PH.D. 7.	ROW TOTAL
12. VET SCI-GENERAL	0	18	165	25	1	209
	0.0	0.5	21.6	14.6	20.0	1.3
13. TECH SPECIALTIES	0	7	6	13	2	28
	0.0	0.2	0.8	7.6	40.0	0.2
14. AGRIC ECONOMICS	613	453	65	14	0	1145
	5.5	12.4	8.5	8.2	0.0	7.3
15. AG ENGINEERING	193	210	44	2	0	449
	1.7	5.7	5.8	1.2	0.0	2.9
16. IRRIGATION	279	193	64	8	0	544
	2.5	5.3	8.4	4.7	0.0	3.5
17. HOME EC-FOOD SCI	184	238	19	4	0	445
	1.7	6.5	2.5	2.3	0.0	2.8
18. AGRIC EXTENSION	28	22	3	0	0	53
	0.3	0.6	0.4	0.0	0.0	0.3
19. AGRIC EDUCATION	2	4	5	2	0	13
	0.0	0.1	0.7	1.2	0.0	0.1
21. RESEARCH	3	4	3	1	0	11
	0.0	0.1	0.4	0.6	0.0	0.1
22. MISCELLANEOUS	0	0	0	2	0	2
	0.0	0.0	0.0	1.2	0.0	0.0
COLUMN TOTAL	11092	3659	763	171	5	15690
	70.7	23.3	4.9	1.1	0.0	100.0

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FILE NONAME (CREATION DATE = 05/12/80)

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SPECGRPS SPECIALTY GROUPS BY EDLEVEL EDUCATION LEVEL

CONTROLLING FOR..

ORGTYPE ORGANIZATION TYPE VALUE = 2. KILIMO HQ-FIELD

* PAGE 1 OF

Exhibit III-S

Unconstrained Demand and Percent Proportions
Kilimo HQ & Field
by Specialty Groups
1980-1986

(Page 1)

SPECGRPS (COUNT / COL PCT)	EDLEVEL: CERTIFICATE 2.	DIPLOMA 3.	B.SC. 4.	MASTERS 6.	PH.D. 7.	ROW TOTAL
1. CROPS-GENERAL	21	10	1	7	0	39
	60.0	17.5	1.5	12.1	0.0	17.6
2. CROP PROTECTION	0	0	1	1	1	3
	0.0	0.0	1.5	1.7	25.0	1.4
4. HORTICULTURE	0	1	3	0	0	4
	0.0	1.8	4.5	0.0	0.0	1.8
5. SOIL SCIENCE	0	0	3	5	1	9
	0.0	0.0	4.5	8.6	25.0	4.1
6. ANIMAL SCI-GENL	0	7	6	3	0	16
	0.0	12.3	9.0	5.2	0.0	7.2
7. ANIMAL HEALTH	4	3	0	0	0	7
	11.4	5.3	0.0	0.0	0.0	3.2
8. ANIMAL NUTRITION	0	0	0	1	0	1
	0.0	0.0	0.0	1.7	0.0	0.5
9. ANIMAL BREEDING	3	0	0	0	0	3
	8.6	0.0	0.0	0.0	0.0	1.4
10. RANGE PASTURE MGT	1	2	1	0	0	4
	2.9	3.5	1.5	0.0	0.0	1.8
11. HIDES AND MEAT	0	1	0	0	0	1
	0.0	1.8	0.0	0.0	0.0	0.5
12. VET SCI-GENERAL	0	0	3	1	0	4
	0.0	0.0	4.5	1.7	0.0	1.8
COLUMN TOTAL	35	57	67	58	4	221
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

FILE NONAME (CREATION DATE = 05/12/80)

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SPECGRPS SPECIALTY GROUPS BY EDLEVEL EDUCATION LEVEL
CONTROLLING FOR..
ORGTYPE ORGANIZATION TYPE VALUE = 2. KILIMO HQ-FIELD
* PAGE 2 OF

Exhibit III-S

(Page 2)

SPECGRPS (COUNT / COL PCT)	EDLEVEL: CERTIFICATE 1.	DIPLOMA 2.	B.SC. 3.	MASTERS 4.	PH.D. 6.	7.	ROW TOTAL
13. TECH SPECIALTIES		0 0.0	0 0.0	1 1.5	2 3.4	0 0.0	3 1.4
14. AGRIC ECONOMICS		2 5.7	0 0.0	2 3.0	2 3.4	1 25.0	7 3.2
15. AG ENGINEERING		0 0.0	1 1.8	0 0.0	0 0.0	0 0.0	1 0.5
16. IRRIGATION		0 0.0	28 49.1	26 38.8	29 50.0	0 0.0	83 37.6
17. HOME EC-FOOD SCI		0 0.0	2 3.5	1 1.5	1 1.7	0 0.0	4 1.8
18. AGRIC EXTENSION		0 0.0	0 0.0	2 3.0	0 0.0	0 0.0	2 0.9
19. AGRIC EDUCATION		0 0.0	2 3.5	16 23.9	5 8.6	0 0.0	23 10.4
21. RESEARCH		4 11.4	0 0.0	1 1.5	1 1.7	1 25.0	7 3.2
COLUMN TOTAL		35 15.8	57 25.8	67 30.3	58 26.2	4 1.8	221 100.0

(8)

FILE NONAME (CREATION DATE = 05/12/80)

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SPECGRPS SPECIALTY GROUPS BY EDLEVEL EDUCATION LEVEL
CONTROLLING FOR..
ORGTYPE ORGANIZATION TYPE VALUE = 3. KILIMO RESEARCH INS
* PAGE 1 O

Exhibit III-T

Unconstrained Demand and Percent Proportion
Kilimo Research Institutes
by Specialty Groups
1980-1986

(Page 1)

SPECGRPS (EDLEVEL: COUNT / COL PCT)		CERTIFICATE 2.	DIPLOMA 3.	B.SC. 4.	MASTERS 6.	PH.D. 7.	ROW TOTAL
1. CROPS-GENERAL	COUNT	348	104	27	24	3	506
	COL PCT	76.7	39.0	27.8	16.4	16.7	51.5
2. CROP BREEDING	COUNT	3	6	8	10	6	33
	COL PCT	0.7	2.2	8.2	6.8	33.3	3.4
3. CROP PROTECTION	COUNT	11	10	5	10	3	39
	COL PCT	2.4	3.7	5.2	6.8	16.7	4.0
4. HORTICULTURE	COUNT	3	22	14	0	0	39
	COL PCT	0.7	8.2	14.4	0.0	0.0	4.0
5. SOIL SCIENCE	COUNT	36	14	11	7	3	71
	COL PCT	7.9	5.2	11.3	4.8	16.7	7.2
6. ANIMAL SCI-GENL	COUNT	27	29	1	7	0	64
	COL PCT	5.9	10.9	1.0	4.8	0.0	6.5
7. ANIMAL HEALTH	COUNT	0	7	0	0	0	7
	COL PCT	0.0	2.6	0.0	0.0	0.0	0.7
8. ANIMAL NUTRITION	COUNT	2	2	1	5	0	10
	COL PCT	0.4	0.7	1.0	3.4	0.0	1.0
9. ANIMAL BREEDING	COUNT	0	5	0	6	0	11
	COL PCT	0.0	1.9	0.0	4.1	0.0	1.1
10. RANGE PASTUREMGT	COUNT	4	10	0	10	0	24
	COL PCT	0.9	3.7	0.0	6.8	0.0	2.4
12. VET SCI-GENERAL	COUNT	0	0	3	14	0	17
	COL PCT	0.0	0.0	3.1	9.6	0.0	1.7
COLUMN		454	267	97	146	18	982

101

FILE NONAME (CREATION DATE = 05/12/80)

* * * * * * * * * * * * * * * * * * C R O S S T A B U L A T I O N O F * * * * * * * * * * * * * * * * *
SPECGRPS SPECIALTY GROUPS BY EDLEVEL EDUCATION LEVEL
CONTROLLING FOR..
ORGTYPE ORGANIZATION TYPE VALUE = 3. KILIMO RESEARCH INS
* PAGE 2 OF

Exhibit III-T

Unconstrained Demand and Percent Proportion

(Page 2)

SPECGRPS (COUNT / COL PCT)	EDLEVEL: CERTIFICATE 2.	DIPLOMA 3.	B.SC. 4.	MASTERS 6.	PH.D. 7.	ROW TOTAL
13. TECH SPECIALTIES	0	1	6	20	0	27
	0.0	0.4	6.2	13.7	0.0	2.7
14. AGRIC ECONOMICS	2	18	7	14	1	42
	0.4	6.7	7.2	9.6	5.6	4.3
15. AG ENGINEERING	11	11	5	6	0	33
	2.4	4.1	5.2	4.1	0.0	3.4
16. IRRIGATION	0	1	0	0	0	1
	0.0	0.4	0.0	0.0	0.0	0.1
17. HOME EC-FOOD SCI	0	4	1	2	0	7
	0.0	1.5	1.0	1.4	0.0	0.7
19. AGRIC EDUCATION	0	0	0	4	1	5
	0.0	0.0	0.0	2.7	5.6	0.5
21. RESEARCH	5	23	8	7	1	44
	1.1	8.6	8.2	4.8	5.6	4.5
22. MISCELLANEOUS	2	0	0	0	0	2
	0.4	0.0	0.0	0.0	0.0	0.2
COLUMN TOTAL	454	267	97	146	18	982
	46.2	27.2	9.9	14.9	1.8	100.0

102

FILE NUNAME (CREATION DATE = 05/12/80)

* * * * * * * * * * * * * * * * * * C R O S S T A B U L A T I O N O F * * * * * * * * * * * * * * * * *

SPECGRPS SPECIALTY GROUPS BY EDLEVEL EDUCATION LEVEL

CONTROLLING FOR..

ORGTYPE ORGANIZATION TYPE VALUE = 5. OTHERMINISTRIES

* PAGE 1 OF

Exhibit III-U

Unconstrained Demand and Percent Proportio[n]
for Other Ministries
by Specialty Groups
1980-1986

(Page 1)

SPECGRPS (COUNT / CEL PCT)	EDLEVEL: SCIENTIFIC DIPLOMA 2.	DIPLOMA 3.	B.SC. 4.	MASTERS 6.	ROW TOTAL
1. CROPS-GENERAL	226	96	127	1	452
	59.4	40.9	78.9	4.8	56.4
4. HORTICULTURE	32	0	0	0	32
	8.3	0.0	0.0	0.0	4.0
6. ANIMAL SCI-GENL	32	28	0	2	62
	5.3	11.9	0.0	9.5	7.7
7. ANIMAL HEALTH	32	12	0	0	44
	8.3	5.1	0.0	0.0	5.5
9. ANIMAL BREEDING	12	0	0	0	12
	3.1	0.0	0.0	0.0	1.5
10. RANGE PASTUREMGT	0	2	0	0	2
	0.0	0.9	0.0	0.0	0.2
12. VET SCI-GENERAL	0	0	3	1	4
	0.0	0.0	1.9	4.8	0.5
14. AGRIC ECONOMICS	0	38	21	8	67
	0.0	16.2	13.0	38.1	[illegible]
15. AG ENGINEERING	45	56	10	2	113
	11.7	23.8	6.2	9.5	14.1
16. IRRIGATION	2	3	0	0	6
	0.5	1.3	0.0	0.0	0.7
19. AGRIC EDUCATION	0	0	0	6	6
	0.0	0.0	0.0	28.6	0.7
COLUMN	384	235	161	21	801
	[illegible]	[illegible]	20.1	[illegible]	100.0

NZANIA AGRICULTURAL MANPOWER SURVEY - 197 (3 2/80

FILE NONAME (CREATION DATE = 05/12/80)

* * * * * * * * * * * * * * * * * * C R O S S T A B U L A T I O N O F * * * * * * * * * * * *
SPECGRPS SPECIALTY GROUPS BY EDLEVEL EDUCATION LEVEL
CONTROLLING FOR..
ORGTYPE ORGANIZATION TYPE VALUE = 5. OTHERMINISTRIES
* P

Exhibit III-U

(Page 2)

SPECGRPS	EDLEVEL COUNT / COL PCT	CERTIFICATE 2.	DIPLOMA 3.	B.SC. 4.	MASTERS 6.	ROW TOTAL
MISCELLANEOUS	22.	0	0	0	1	1
		0.0	0.0	0.0	4.8	0.1
COLUMN TOTAL		384	235	161	21	801
		47.9	29.3	20.1	2.6	100.0

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FILE NONAME (CREATION DATE = 05/12/80)

* * * * * * * * * * * * * * * * * * C R O S S T A B U L A T I O N O F * * * * * * * * * * * * * * *
SPECGRPS SPECIALTY GROUPS BY EDLEVEL EDUCATION LEVEL
CONTROLLING FOR..
ORGTYPE ORGANIZATION TYPE VALUE = 6. PARA STATALS
* PAGE

Exhibit III-V

Unconstrained Demand and Percent Proportions, for Parastatals, by Specialty Groups, 1980-1986

(Page

SPECGRPS (COUNT / COL PCT)	EDLEVEL: CERTIFICATE 2.	DIPLOMA 3.	B.SC. 4.	MASTERS 6.	PH.D. 7.	ROW TOTAL
1. CROPS-GENERAL	1040	314	198	11	4	1567
	79.3	57.3	54.0	15.9	12.9	67.4
2. CROP BREEDING	0	6	0	0	0	6
	0.0	1.1	0.0	0.0	0.0	0.3
3. CROP PROTECTION	44	12	1	3	0	60
	3.4	2.2	0.3	4.3	0.0	2.6
4. HORTICULTURE	28	4	2	1	0	35
	2.1	0.7	0.5	1.4	0.0	1.5
5. SOIL SCIENCE	33	1	0	3	0	37
	2.5	0.2	0.0	4.3	0.0	1.6
6. ANIMAL SCI-GENL	35	24	20	6	5	90
	2.7	4.4	5.4	8.7	16.1	3.9
7. ANIMAL HEALTH	22	4	0	0	0	26
	1.7	0.7	0.0	0.0	0.0	1.1
8. ANIMAL NUTRITION	0	0	0	3	2	5
	0.0	0.0	0.0	4.3	6.5	0.2
10. RANGE PASTUREMGT	0	1	1	0	0	2
	0.0	0.2	0.3	0.0	0.0	0.1
11. HIDES AND MEAT	20	19	2	0	0	41
	1.5	3.5	0.5	0.0	0.0	1.8
12. VET SCI-GENERAL	0	1	9	12	2	24
	0.0	0.2	2.5	17.4	6.5	1.0
COLUMN	1311	[illegible]	367	69	31	2326

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TANZANIA AGRICULTURAL MANPOWER SURVEY - 1979 05/12/

FILE NONAME (CREATION DATE = 05/12/80)

* * * * * * * * * * * * * * * * * * C R O S S T A B U L A T I O N O F * * * * * * * * * * * * * * *
SPECGRPS SPECIALTY GROUPS BY EDLEVEL EDUCATION LEVEL
CONTROLLING FOR..
ORGTYPE ORGANIZATION TYPE VALUE = 6. PARA STATALS
* PAGE

Exhibit III-V

Unconstrained Demand and Percent Proportion for Parastatals

(Page 2)

SPECGRPS (COUNT / COL PCT)	CERTIFICATE 1.	DIPLOMA 3.	B.SC. 4.	MASTERS 6.	PH.D. 7.	ROW TOTAL
13. TECH SPECIALTIES	0	0	4	5	5	14
	0.0	0.0	1.1	7.2	16.1	0.6
14. AGRIC ECONOMICS	29	53	80	8	0	170
	2.2	9.7	21.8	11.6	0.0	7.3
15. AG ENGINEERING	2	20	17	5	3	47
	0.2	3.6	4.6	7.2	9.7	2.0
16. IRRIGATION	42	48	17	5	1	113
	3.2	8.8	4.6	7.2	3.2	4.9
17. HOME EC-FOOD SCI	16	41	16	7	9	89
	1.2	7.5	4.4	10.1	29.0	3.8
COLUMN	1311	548	367	69	31	2326
TOTAL	56.4	23.6	15.8	3.0	1.3	100.0

TANZANIA AGRICULTURAL MANPOWER SURVEY - 1979 05/12/80

FILE NONAME (CREATION DATE = 05/12/80)

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SPECGRPS SPECIALTY GROUPS BY EDLEVEL EDUCATION LEVEL
CONTROLLING FOR..
ORGTYPE ORGANIZATION TYPE VALUE = 7. PRIVATE SECTOR
* PAGE 1

Exhibit III-W

Unconstrained Demand and Percent Proportion for Private Sector 1980-1986

SPECGRPS (COUNT / COL PCT)	EDLEVEL: CERTIFICATE 2.	DIPLOMA 3.	B.SC. 4.	ROW TOTAL
1. CROPS-GENERAL	20	5	6	31
	100.0	100.0	85.7	96.9
6. ANIMAL SCI-GENL	0	0	1	1
	0.0	0.0	14.3	3.1
COLUMN TOTAL	20	5	7	32
	62.5	15.6	21.9	100.0

Chapter IV: QUANTITATIVE SUPPLY ESTIMATES DATA PRESENTATION AND ANALYSES

Chapter IV: Quantitative Supply Estimates Data Presentation and Analysis

This chapter presents information on two major aspects of the supply of agriculturally trained personnel.

- The factors involved in calculating the projected supply at each educational level.
- The institutional capacities of the domestic training institutions which produce the personnel to be utilized.

The supply of Tanzanian professional and technical agricultural manpower is from the twelve Ministry of Agriculture Training Institutes (MATIs), the Faculty of Agriculture and Veterinary Science of the University of Dar Es Salaam in Morogoro, and foreign institutes of higher learning. The analysis breaks down the figures in terms of educational levels, by certificate, diploma, B.Sc., post graduate diploma, M.Sc., and doctoral degree levels.

The data on existing and projected supply was obtained through statistical data collection on enrollments and outputs at the various educational and training institutes. Where possible, the projections have been extrapolated through 1991. Interpretive interviews were held to understand the complex issues and problems involved. Information on graduates from foreign institutions of higher learning is based upon past records, and estimates from the various donor countries and agencies which provide scholarships for agricultural staff.

Exhibit IV-A summarizes the presently projected cumulative supply of agriculturalists These outputs are based on a number of assumptions about sectoral quota allocations, priority access in manpower selection, drop-out rates, promotions after training, and attrition. These could and do change periodically. Shifts in surrounding conditions, circumstances, policy priorities, or relative emphases in programs have occurred even in the one year course of this study. Therefore, every effort has been made to select a reasoned approximation to the most likely levels of production. As these figures are amongst the most crucial aspects of this study, their discussion in the body of the text is necessarily very detailed.

Exhibit IV-A

Projected Cumulative Supply of Agriculturalists
All Educational Levels, 1980 - 1991

Ed Level	1979 - 1986								1987 - 1991					Aggregate Increase 1979-1986	Av. Annual Rate of Increase 1979-1986
	79	80	81	82	83	84	85	86	87	88	89	90	91		
Certificates[1]	3071	3097	3079	3209	33[illegible]	3506	3652	3807	3975	4150	4346	4551	4767	736	3.4%
Diplomas	1366	1718	2107	2299	2445	2633	2833	3040	3276	3516	3785	4087	4392	1674	18.0%
B.Sc.	708	663	686	668	740	792	853	907	945	984	1022	1058	1114	199	4.0%
P.G.D.[2]	35	35	35	35	35	35	35	35	35	35	35	35	35	0	0
M.Sc.[3]	143	190	222	275	332	370	391	410	418	418	418	418	418	267	27.0%
Ph.D.[3]	33	39	37	44	58	67	76	86	86	86	86	86	86	53	23.0%
	5356	5742	6166	6530	6968	7403	7840	8285	8735	9189	9692	10235	10812	2929	7.8%

Notes: 1. Includes merits.
2. Assumes current stock of PGDs is maintained at present level.
3. Projections for 1987-91 are at maintenance level, given lack of information upon which more informed assumptions could be made.

A. Supply Projections

The summary of cumulative supply shown in Exhibit IV-A is based on a complex set of calculations. These supply projections look at the most likely growth paths in agricultura personnel (7.8% average net growth rate per year). They are based on recent experience and trends, and the foreseeable consequences of these events. They set a baseline for what will probably occur if no major changes are instituted; and if no major conditions are altered. They are a conservative and prudent forecast of the case most likely to prevail unless changes are made.

In what follows, the detailed calculations behind the summary figures are given for each educational level. In every calculation there exists a combination of:

- empirical data,
- working assumptions, and
- judgemental factors.

These can be enumerated as follows.

(1) The size of the manpower pools available to enter training for each educational level. These are dependent upon the rate of expansion of enrollments in secondary schools in the future.

(2) Recent results in the actual allocation of manpower training intakes to the agricultural sector by the Ministry of Manpower Development.

(3) The career choices of those allocated, whether or not to accept the specific allocation, and actually become part of training intakes.

(4) The quality of agricultural training intakes, which is dependent on the sector's priority ranking in the selection of individuals from each year's manpower pools.

(5) The drop-out rates which occur, and in turn are a function of the intake quality level of entrants from the pool.

(6) The educational level staffing pattern proportions needed, as perceived by the manpower planners, and unconstrained demand respondents.

(7) The institutional capacity limits of the training institutes to handle students.

(8) The availability of overseas scholarships, and actual places at institutions.

(9) The judgemental factor concerning which staff levels should receive relatively greater emphasis at a certain point in time, in light of certain technical and economic agricultural sector factors.

(10) The annual loss of staff at one educational level who pass through training courses and are promoted to the next higher level.

(11) The normal annual attrition at each educational level.

It is naturally necessary to understand the mix of these factors. Exhibit IV-B gives a graphic presentation of why end-users cannot get as many personnel as they need. Exhibit IV-C demonstrates another aspect of the same problem, but emphasizes how each educational level not only receives new staff, but also loses many staff each year.

In the pages to follow, the effects of these graphic diagrams are demonstrated in statistical tables for each educational level. The detailed calculations are shown so that the actual sequential steps in the calculation can be properly understood. In the future when changes are made and figures need to be updated, these tabular formats can be utilized. The text describes each step in the supply calculations.

Exhibit IV-B

Example of Agricultural Manpower System Supply Stages: Certificates

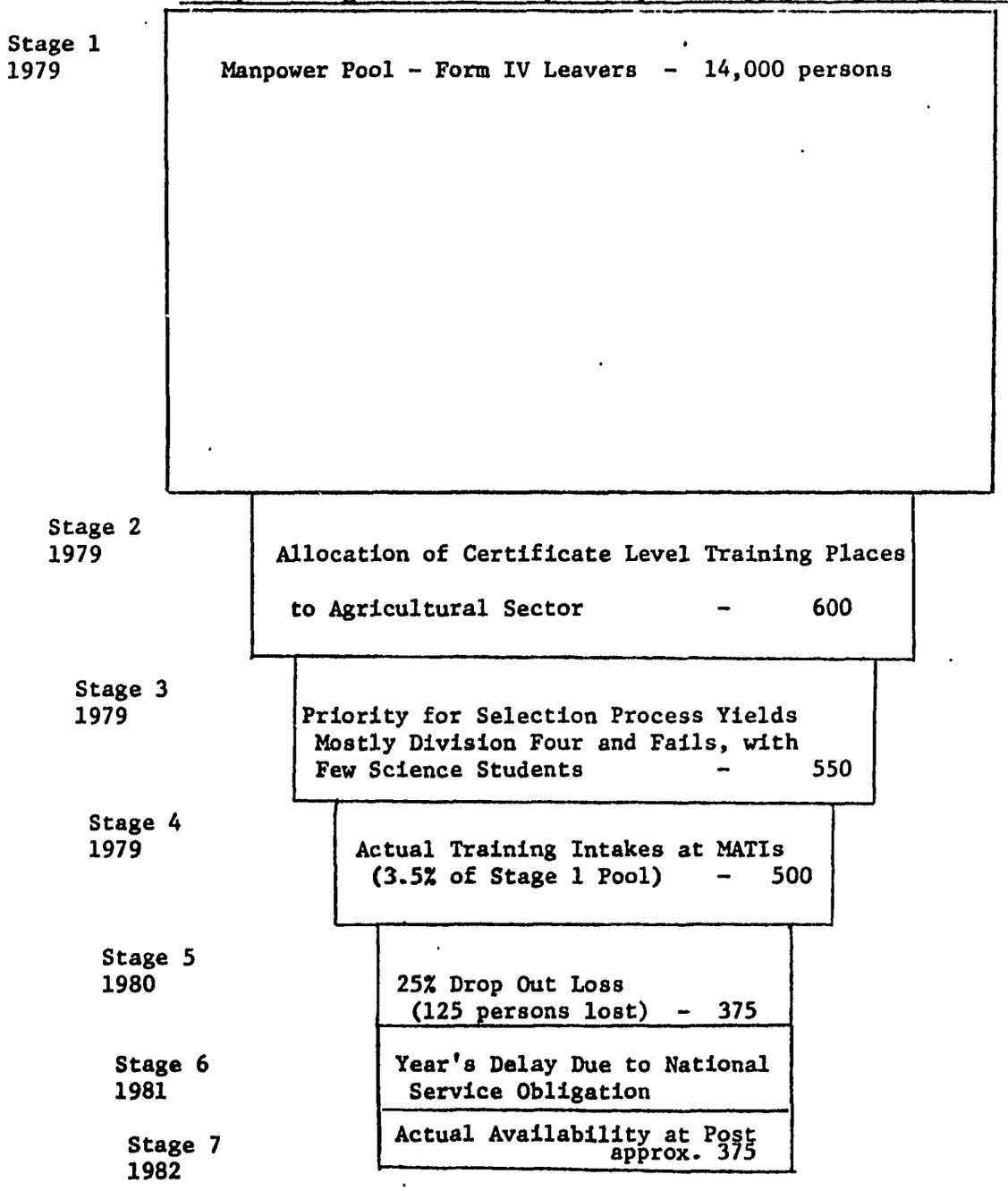
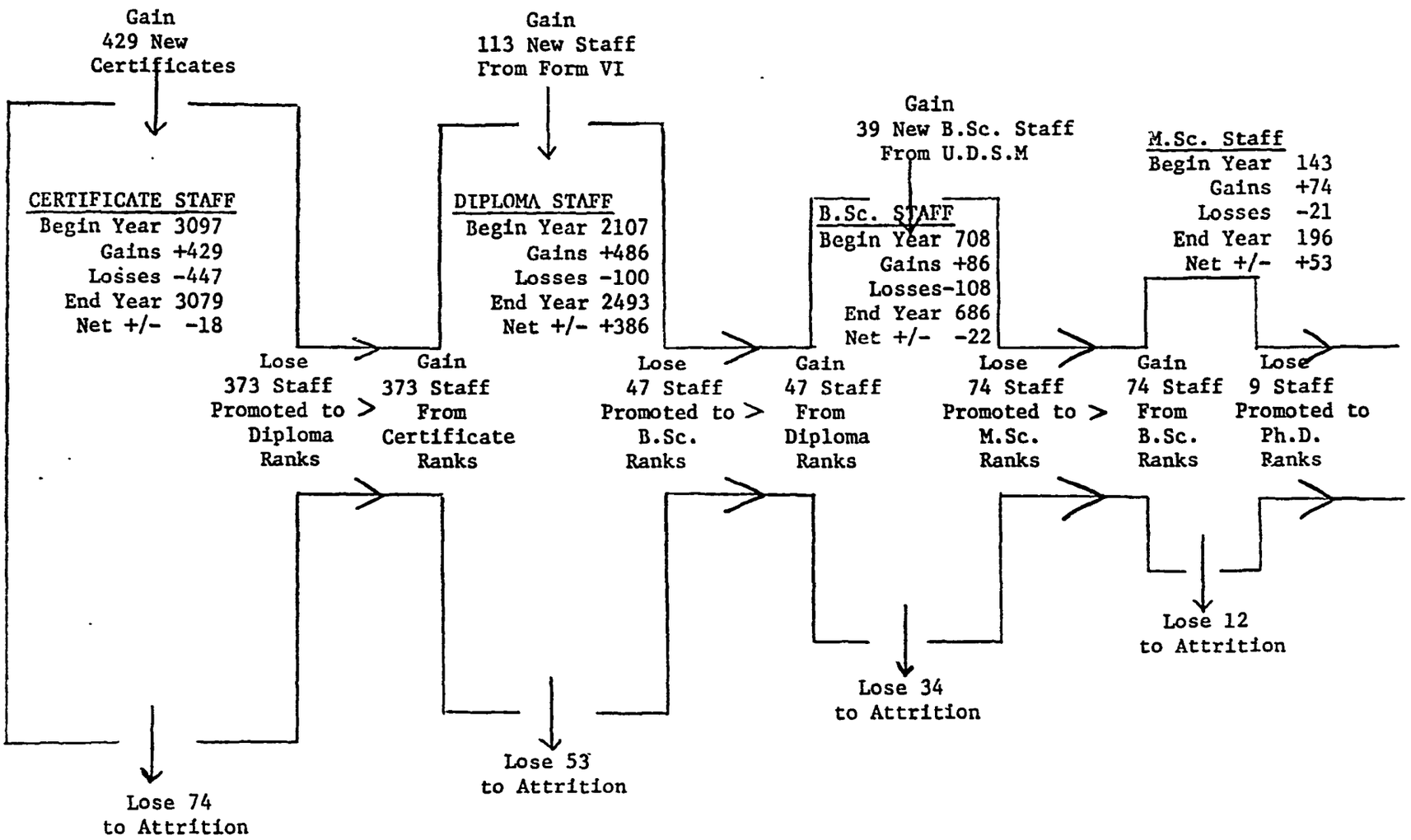


Exhibit IV-C

Dynamics of Annual Manpower Flows
Agricultural Manpower System



1. MATI Certificate Supply Projections

Exhibit IV-D shows the detailed calculations for cumulative supply of certificate staff. In the discussions below, the most important factors affecting the certificate situation are discussed, row by row, as portrayed in the exhibit. These explain the data, its assumptions and the judgements based on them. They help to appreciate the facts of the situation, the interpretations that can be placed on them, and what could potentially be done to effect changes in the position of the sector.

a. Certificate Pool (Rows A,B,C)

The bulk of certificate entrants come from Form IV leavers each year. They are normally required to possess principal passes in biology, math, and another science as well as in English and Kiswahili. It has not been possible to research whether or not selected entrants do in fact possess all the required qualifications. The best information available indicates that in those years when the agricultural sector has priority access in selection, that entrants do possess more of the requisites. In other years, many others may have to be chosen in order to supply end users with at least part of their quantitative needs.

The only other source of certificate entrants are a negligible number of persons who enter from sub-technical cadres. These individuals pre-qualify at in-service short courses.

The Form IV pool projections in Exhibit IV-D are shown broken out into public and private school sources. It is understood that a fairly recent policy will limit the production of private school leavers in the future. What the overall effect will be, and when it will occur were not known at the time this report was written. Therefore, the only basis upon which to make projections were the past trends in enrollments and outputs. These could change, and should naturally be closely monitored.

b. Intakes (Row D)

In recent years intakes have been approximately 3.5% of the manpower pool. For that reason, the baseline projection of future growth is made at the 3.5% level. This

Exhibit IV-D

Certificate Level: Projected Outputs and Cumulative Supply

		1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
A	Form IV Mnpwr Pool-Private Schools[1]	4783	5564	6839	7230	7881	8590	9363	10206	11125	12126	13218	14407	15704
B	-Public Schools[1]	+9315	9398	8568	8501	8635	8870	8870	9274	9274	9274	9578	9578	9578
C	Total Pool	14098	14962	15407	15731	16516	17460	18233	19480	20399	21400	22796	23985	25282
D	Intakes to Certif. Prog. (3½% x C)[2]	511	488	524	539	551	578	611	638	682	714	749	798	840
E	Outputs of Cert.Prog. (16% Drop Out)[3]		444	429	409	440	453	463	486	513	536	573	600	629
F	Prior Year-Cumulative Certif. Staff[4]		+3071	3097	3079	3209	3358	3506	3652	3807	3975	4150	4346	4551
G	Cumulative Certif. Staff-Before Losses[5]		3515	3526	3488	3649	3811	3969	4138	4320	4511	4723	4946	5180
H	Attrition Loss (2.3% x G)[6]		-81	-74	-80	-84	-88	-91	-95	-99	-104	-109	-114	-119
I	Loss to Diploma Ranks[7]		-337	-373	-199	-207	-217	-225	-236	-246	-257	-268	-281	-294
J	Cumulative Certif. Staff-G - (H+I)	3071	3097	3079	3209	3358	3506	3652	3807	3975	4150	4346	4551	4767
K	Net Growth Rates - Per Annum		0.8%	-0.6%	4.2%	4.6%	4.4%	4.2%	4.2%	4.4%	4.4%	4.7%	4.7%	4.7%

Notes: 1. From Seventh Education Credit Request to World Bank.

2. 1979 and 1980 intakes are actuals. Each succeding year's intakes are calculated by multiplying .035 times preceding year's Form IV total manpower pool output. The 3.5% percentage figure represents ar approximation of the percent of Form IV pool received in the last few years by certificate training programs.

3. Year of Posting is utilized for output figures. Year of posting is the Fiscal Year following graduation. Graduation is usually by June; and posting is in the next Fiscal Year, which begins on Julyl. Actual physical availability at post would be another year into the future because of national service obligations.

4. From previous year, Row J. An accounting entry to ease the in-column calculations.

5. This calculation is made here so that the subsequent multiplication of Row G by the attrition percentage in Row H can be carried out more simply.

6. Attrition calculation factor is from Exhibit III-H.

7. From Exhibit III-F, Row F, diploma outputs from the certificate pool supply source. The addition to the diploma ranks in the year of diploma graduation is the effective year of loss to the certificate ranks.

is felt to be the prudent approach based on past allocative practice. If the percentage were increased or decreased, output would rise or fall commensurately. One way in which more adequate service ratios for rural communities could be accomplished would be to increase the intakes.

c. Outputs (Row E)

The number of certificate outputs is primarily conditioned by the drop-out rate. Since 1976 the drop-out rates have been around 25% of intakes. This is naturally a major inefficiency in securing the maximum number of employees at the minimum cost. The proximate cause of the high drop-out rate appears to be that agricultural training institutions are not being allocated sufficient Form IV graduates with higher divisional passes; as well as those with better than average achievement in biology, math, and other sciences.

An updated analysis of Ministry of Education and National Examination Council statistics was carried out for the 1978 Form IV leavers provisionally selected for agricultural training. This analysis indicated that the pass levels of prospective entrants was to be considerably higher than in the immediate past.* The breakdown was:

Exhibit IV-E

1978 Form IV Leavers Provisionally Selected for Agricultural Training, By Level of Pass

Pass Level	Div. I	Div. II	Div. III	Div. IV	Fail	Unknown
Number	0	62	279	57	4	10
Percentage	0	15%	68%	14%	1%	2%

Notes: Compiled from Ministry of Education, 1978 Form Four Secondary School Leavers, and National Examination Council of Tanzania, Exam Results, November, 1978, Form Four School Candidates (Five Volumes)

*For some confirmatory recent agro-vet examination results, see Lulandala, G.D., The Manpower Development Division's Two Years Experience with the Agro-Vet Common Examination Ministry of Agriculture, Manpower Development Division, Curriculum Development Section, (mimeo, n.p., n.d., circa. 1979)

The Ministry of Manpower Development has indicated that the agricultural sector will be receiving higher priority in the allocation of better quality personnel in the next few years. MATI system records indicate that the drop out rate in 1974-75 was 7%; and as mentioned above the 1976-79 rate was 25%. It is not known for how long the agricultural sector can maintain its higher priority standing in the competition for scarce secondary school leaver talent. Experience from the 1970s indicates that a cautious course of drop out rate projection should be adopted. Given the empirical spread of educational attrition from 7% to 25%, the best that can be done is to choose 16% as a middle course. This has been done. Should it become easier to predict quality consistency in entering classes, the figures can be adjusted accordingly.

d. Prior Year - Cumulative Certificate Staff (Row F)
Cumulative Certificate Staff-Before Losses (Row G)

These two rows are inserted in the table to make the steps in supply calculation clearer and easier to follow. The Row F prior year cumulative staff number (from Row J) is needed so that the annual output from Row E can be added to it. Row G is merely the sum of Rows E and F, before the annual attrition calculation is made.

e. Attrition Loss (Row H)

Normal annual attrition has been calculated at 2.3% in Exhibit III-H. This is multiplied by the Row G cumulative supply-before losses; and the result entered with a minus sign. The result will be added to the next row, and then subtracted from Row G to obtain the net cumulative supply.

f. Loss to Diploma Ranks (Row I)

As the Exhibit IV-C diagram indicated, there are not only inflow gains of new staff each year, but also outflow losses. These occur when staff attend training programs which result in their promotion or departure from an educational level. Row I records those certificate level persons who graduated from the diploma program each year as a loss to the certificate level.

g. Net Cumulative Certificate Staff (Row J)

When Rows H and I are totalled, and then subtracted from Row G, the net or actual cumulative staff available to the agricultural sector can be known. This is the figure that is utilized in supply and demand calculations in subsequent analyses.

h. Net Growth Rate (Row K)

The annual growth rate in staff is calculated in this row. The year to year gap is calculated and then divided by the prior year's total, to derive the actual increase or decrease in educational level complement.

Discussion

It is obvious from the figures that the major limitationson certificate staff growth are multiple.

The size of the manpower pool is not growing very rapidly. The percentage allocated to the agricultural sector is low. The drop out rate can range as high as 25%, dependent on the quality level of the intakes; which in turn depends on the sector's priority level for selection of the better students. The attrition loss is not exceptional. However, the loss to diploma ranks is highly significant.

The low 1979/80 and 1980/81 net growth rates are an anomaly due to exceptional and non-repeatable loss to diploma ranks in those years.

The major intervention points for making improvemements in the certificate supply system appear to be:

(i.) to increasethe percentage allocation from the manpower pool;

(ii.) to increase the quality levels of the allocation, to cut down on drop outs

2. MATI Diploma Supply Projections

Exhibit IV-F gives the detailed calculations for the cumulative supply of diploma staff. The calculations are a more complex and problematical matter than those for the certificate level. This is because there are two manpower pool sources, and more areas in which judgement enters. The background to these issues is given below in row by row coverage of the table. (Readers of this report who have not read the preceeding section on the certificate level may wish to do so; it gives a more complete picture of each step in the supplies calculation process, which will not be repeated here.)

a. Manpower Pools for Diploma Course (Rows A and B)

Entrants to the diploma program have come primarily from the ranks of certificate staff. This internal career mobility route was designed to allow the best performers to advance through an in-service training route. In the 1979 diploma graduating class about 68% of its 251 members were certificates with two or more years of field experience.

The remaining 32% of the class in recent years have been composed of Form VI graduates who do not go on to university. These Form VI persons are a pre-service pool who enter the diploma program after one year in national service. (This is in contrast with Form VI graduates who do go on to university, who must also contribute two years in work assignments before entering their programs.)

b. Intakes (Rows C,D, and E)

The entering class sizes for diploma training are therefore controlled by the growth of the certificate staff ranks and the Form VI classes. Entrants from Form VI have been about 70 to 80 persons per year, or around 4%. This figure has just undergone a marked change. The 1980 entering class will have 119 Form VIers. This is 5.6% of the pre-service pool; and it is assumed that this rate will continue.

It is not possible to predict exactly how many certificate staff will also enter In recent years the size of the certificate intakes have been about 6.8% of that pool. This figure is used in these calculations as the most likely number.

Exhibit IV-F

Diploma Level: Projected Outputs and Cumulative Supply

	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
A. Certificate Staff Pool[1]	3071	3097	3079	3209	3358	3506	3652	3807	3975	4150	4346	4551	4767
B. Form VI Pre-Service Pool[2]	2136	2136	2136	2185	2185	2185	2185	2705	3226	3226	3226	3226	3226
C. Intakes to Dipl. Prog.[3] (6.8% x A)c.	354	393	209	218	228	238	248	259	270	282	296	309	324
D. Intakes to Dipl. Prog.[4] (5.6% x B)	80	119	119	119	119	122	122	122	122	151	181	181	181
E. Total Intakes	434	512	328	337	347	360	370	381	392	433	477	490	505
F. Outputs from Certif. Pool[5]	171	337	373	199	207	217	226	236	246	257	268	281	294
G. Outputs from Form VI Pool	80	76	113	113	113	113	116	116	116	116	143	172	172
H. Total Outputs	251	413	486	312	320	330	342	352	362	373	411	453	466
I. Prior Year-Cumulative Dipl. Staff[6]		+1366	1718	2107	2299	2445	2633	2833	3040	3276	3516	3785	4087
J. Cumulative Diploma Staff-Before Losses[7]		1779	2204	2419	2619	2775	2975	3185	3402	3649	3927	4238	4553
K. Attrition Loss[8] (3% x J)		-53	-66	-73	-79	-83	-89	-96	-102	-109	-118	-127	-137
L. Loss to B.Sc. Ranks[9]		-8	-31	-47	-95	-59	-53	-49	-24	-24	-24	-24	-24
M. Cumulative Dipl. Staff- M=J-(K+L)	1366	1718	2107	2299	2445	2633	2833	3040	3276	3516	3785	4087	4392
N. Net Growth Rates		26%	23%	9%	6%	8%	8%	7%	8%	7%	8%	7%	7%

Notes:
1. From Exhibit IV-D, Row J.
2. From Seventh Education Credit Request to World Bank.
3. 6.8% rate based on "normal" past diploma intake levels, as percent of certificate staff. However, 1977/78 and 78/79 intakes were exceptionally high for reasons which will not likely be repeated. See note 5 on this. Intakes from certificate pool occur in same year as pool exists.
4. 5.6% rate is based on 1980 allocations of 119 training places to Form VI leavers. This is up from 84, or 4% of 1977 Form VI graduates allocated in past. Note that intakes are based on a two year delay. For example, a 1980 Form VI graduate goes to national service in 1981, and only enters diploma course in 1982.
5. Abnormally large outputs occur in 1980 and 1981 because of an effort to give an overlarge backlog of qualified certificate staff an opportunity to receive advanced training; not based on 6.8% rate. Please also note that an academic year 1978/79 entrant on the two year program is posted directly upon graduation, at the end of the second year.
6. From Row M, the previous year. This row is for convenience of in-column calculation.
7. Row J = Rows H + I
8. From Exhibit III-H attrition calculation.
9. From Exhibit IV-H, Row F. Likely outputs of diploma personnel promoted to B.Sc. ranks, in the year of actual loss to the diploma ranks.

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However, the numbers who actually enter training is at the discretion of the Minist of Agriculture, Manpower Development Division.

Agricultural sector manpower planners, educators and end users would like to upgrade the quality of diploma entrants. They hope to do this by drawing increasin larger numbers from the pre-service Form VI graduate pool. Ideally, they would lik to have entering classes eventually composed of 50% Form VIers and 50% certificates This is in preference to the present 32%/68% mix. An operational objective is to arrive at diploma classes of (say) 250 persons from each source. The planners do have some latitude. They can vary the number of intakes from certificate level according to the number of Form VIers allocated, until the desired 50/50 mix is eventually achieved.

There are a number of professional considerations in this matter. One of the is a concern for adequate stability and continuity of effort in the field among certificate level ranks of contact agents. The constant departures and arrivals of personnel returning from and leaving for training are naturally disruptive to proper field work. This was documented in Chapter III. On the one hand, therefor every attempt should be made to minimize the incidence of disruption; and to keep certificate entrants to about 250 per year.

On the other hand, an important part of any effective personnel system is to provide skills upgrading and career mobility opportunities for the more talented certificate staff. Such opportunities help to strengthen loyalty and motivation o the job.

c. Outputs (RowsF,G, and H)

In the past four years (1976-79) annual output of diplomas has increased from 221 to 251. The graduating classes in 1980 and 1981 will be an above normal 412 and 486 persons. Intakes for two earlier years had been temporarily raised to clear an exceptionally large backlog of certificate staff qualified for diploma entrance. This will not likely occur again.

d. Prior Year and Gross Cumulative Staff (Rows I and J)

(These are accounting entries only, to demonstrate the order in which the calculation steps are carried out.)

e. Attrition Loss (Row K)

Attrition was calculated at 3% in Exhibit III-H; and is computed here by multiplying 3% times the gross cumulative staff in Row J.

f. Losses to B.Sc. Ranks (Row L)

Row L reflects the losses of diploma staff to the professional officer ranks at the time of their graduation. Both UDSM and overseas scholarship programs accoun for these losses. In recent years UDSM intakes and outputs have been largely comprised of diploma personnel.

g. Net Cumulative Diploma Staff (Row M) and Net Growth Rates (Row N)

These are the resulting effective staffing levels, and their growth rates. As will be noted, the sizable 1980 and 1981 increases are special casesnot likely to repeat themselves again.

Discussion

One major area of note is the 6.8% per annum drainage of the certificate ranks. This is a fair rate of cadre promotion through a training program; and removes many hundreds of staff from their field work each year. Raising the Form VI intake proportion is probably advisable; both to avoid further disruption of the certificate ranks' work, as well as to gain higher quality entrants. Skills upgrading can be done in short courses and on-the-job training for certificates; and provisions for salary increments can hopefully provide continuing financial rewards.

The Form VI pool, fortunately, will expand considerably in 1986 and 1987 due to a secondary school development effort. Thus, the most sizeable diploma level expansion will not be likely to occur until 1988 and 1989 (See Row G).

The losses to B.Sc. levels are very marked from 1981 through 1986. These figures include the U.S. funded Training for Rural Development Project, Phases I and II. Phase II (240 scholarships over 4 years) has not yet been officially approved by the donor agency, as it was awaiting the results of this study. The 1987-91 projection of losses to the B.Sc. level are an arbitrary estimate of the number of overseas scholarships which will be secured. It does not have empirical grounding, being too far into the future to predict with any assurance whatsoever.

A check on the likely enrollments at MATIs of both educational levels indicates that the physical facilities capacities will not be exceeded by these projections through the year 1986.

Generally speaking, the only major scope for diploma expansion beyond its presently projected trend is through the increased allocation of Form VI entrants.

3. Proportions Between Certificate and Diploma Supplies: A Discussion

The data presentation on certificate and diploma level supplies demonstrates what will be most likely to occur in the future unless changes are made in intake quantity and quality. Exhibit IV-G below shows how the proportions between just the certificate and diploma levels will change.

Exhibit IV-G

Certificate and Diploma Level: Projected Staffing Pattern Proportions 1979, 1986, 1991, and Ideal

	(1) Existing Staffing Pattern Proportions 1979[1]	(2) Projected Production Proportions 1979-1991[1]	(3) Projected Resulting Staffing Pattern Proportions[1] 1986	1991	(4) Ideal Staffing Pattern Proportions from Unconstrained Demand 1987[2]
Certificate	61%	36%	55%	52%	73%
Diploma	31%	64%	45%	48%	27%

Notes: 1. Derived from Exhibit IV-A
2. Derived from Exhibit III-J

The sharp contrast between the existing and production proportions pattern (Columns 1 and 2) and the resulting and ideal staffing patterns (Columns 3 and 4) should not be misinterpreted. It would be easy to jump to inaccurate conclusions, without careful examination of the full picture. The fundamental situation appears to be:

(1) Although the MATIs can be utilized to produce either certificate or diploma level staff, there may not be much flexibility in the setting of both production proportions and the resulting staffing patterns. As shown in the manpower pools analyses, there are simply not enough personnel being produced at Form IV and Form V levels by the secondary school system to satisfy end-user demand.

(2) The certificate ranks are a major supply pool for the diploma level; and those that go into the diploma ranks also supply a number of the B.Sc's produced. It is

therefore altogether natural and expected that given a general shortage of Form IV students, the certificate ranks will appear to be in steady decline.

(3) This depletion is evidence of the success of the career mobility system at work. It allows the better performers to rise. It also places more highly skilled and specialized diploma personnel in contact with the farmers in the field.

(4) As Exhibit III-L demonstrated, there is a current relative deficit in the dipl staffing proportion. By contrast the certificate proportion is perceived as needin a slight proportional reduction (7.7 to 7.0), when sub-technical cadres are included in the calculation.

In addition, as Exhibit III-J shows, the percentage increases which regional a district respondents demanded for the diploma level (+733%) is far greater than th for certificates (+602%). Thus, diplomas are in greater demand, in relative terms.

(5) Further support for this view is presented in the utilization chapter on manpower efficiency and effectiveness. It is felt that some years will pass befor a vastly enlarged extension contact agent establishment could be justified or financed. There is also a consensus among most agricultural sector analysts which indicates that considerable farming systems investigation will be required to evolve more technically and economically viable recommendations to be communicated to farmers. This is especially so with regard to half the population which is living in dryland areas.

Thus, in the absence of both recurrent finance and viable small scale farmer technologies in the decade ahead, it is felt unwise to overexpand certificate rank Rather it would probably be wiser to utilize the sub-technical cadres more effecti ly.In addition, these cadres are potentially more cost-effective, other things bei equal.

(6) Lastly, the situation appears to call for greater expertise at the diploma an above levels. Paradoxically, the higher educational levels are apparently needed more at this point in time.

4. B.Sc. Supply Projections: Domestic and International

Exhibit IV-H gives the detailed calculations for the cumulative supply of B.Sc. staff.

a. Manpower Pools for B.Sc. (Rows A and B)

There are two sources for B.Sc. level entrants. First are the diploma staff who come through the mature entry program. Second are the Form VI graduates who had been preselected for university entrance, but enter only after their one year national service and two year work assignments.

The diploma supply pool increases steadily, and is taken from Exhibit IV-F. The Form VI pool is relatively stable until 1986 and 1987, when there is a major 50% increase in availabilities due to secondary school expansion.

b. Intakes (Rows C,D, and E)

Most recently the UDSM-Faculty of Agriclture and Veterinary Science enrollments consisted of about 58 Form VI entrants, and 106 mature entry diploma staff.* This configuration appeared to occur due to a combination of factors: a temporary delay in the pipeline for Form Form VIers finishing their national service and work assignments; the allocation of most of the available secondary graduates to other sectors; and a great shortage of graduates with adequate entry qualifications in the sciences. Thus, the mature entry pool of diploma staff have been supplying a majority of B.Sc. students in the past few years. It is not known how many additional persons can be found amongst the diploma staff who could meet UDSM-Morogoro entrance qualifications. Close monitoring of actual university intakes wil be essential to proper planning.

In 1980, 104 Form VIers have been allocated to the B.Sc. program; 79 to agriculture and 25 to veterinary science. This is a major change. These 104 entrants represent 4.7% of the 1977 secondary school graduating class of 2,222 persons; and this new percentage allocation is utilized in the output projections shown in Exhibit IV-H. It is expected that Form VI graduates will predominate

*All discussions and figures about the UDSM-Morogoro Faculty refers only to the Agriculture and Veterinary Science Divisions

Exhibi IV-H

B.Sc. Level: Projected Outputs and Cumulative Supply

	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
A. Diploma Staff Pool[1]	1366	1718	2107	2299	2445	2633	2833	3040	3276	3516	3785	4087	4392
B. Form VI Pool[2]	2136	2136	2136	2185	2185	2185	2185	2705	3226	3226	3226	3226	3226
C. Intakes to B.Sc.-Intl. Schlshps.[3]	33	50	101	63	56	52	25	25	25	25	25	25	25
D. Intakes to B.Sc. at 4.7% x B(UDSM)[4]	42	104	100	100	100	100	100	103	103	103	127	152	152
E. Total Intakes	75	154	201	163	156	152	125	128	128	128	152	177	177
F. Outputs from Intl. Schlships.[5]	-	8	31	47	95	59	53	49	24	24	24	24	24
G. Outputs from UDSM (Fac. Ag/Vet)[6]	-	39	62	39	98	94	94	94	94	97	97	97	119
H. Total Outputs		47	93	86	193	153	147	143	118	121	121	121	143
I. Prior Year-Cumulative B.Sc. Staff[7]	-	+708	663	686	668	740	792	853	907	945	984	1022	1058
J. Cumulative B.Sc. Staff-Before Losses[8]	755	756	772	861	893	939	996	1025	1066	1105	1143	1201	
K. Attrition Loss[9] (3.9% x J)	-	-29	-29	-30	-34	-35	-37	-39	-40	-42	-43	-45	-47
L. Loss to M.Sc. Ranks[10]	-	-63	-41	-74	-87	-66	-49	-50	-40	-40	-40	-40	-40
M. Cumulative B.Sc. Staff M=J-(K+L)	708	663	686	668	740	792	853	907	945	984	1022	1058	1114
N. Net Growth Rates		-6%	3%	-3%	11%	7%	8%	6%	4%	4%	4%	4%	5%

Notes:
1. From Exhibit IV-F, Row M.
2. From Exhibit IV-F, Row B.
3. Estimates are approximate through 1984; and arbitary afterwards. Intakes are from diploma pool, in the same year.
4. Intakes occur 3 years after year of graduation, during which national service and work assignments are undertaken.
5. Outputs occur 2 years after intakes, as most program durations are about 24 months for overseas courses where entran are diploma holders. 6% drop-out rate applied.
6. Outputs occur 3 years after intakes. For example, January 1979 intakes will graduate in December 1981, but be poste in second half of fiscal year 1982. 6% drop-out rate applied.
7. From previous year, Row M.
8. Row J + Rows H + I.
9. From Exhibit III-H attrition calculation.
10. From Exhibit IV-I, Row H, the year of M.Sc. outputs being the effective year of loss to the B.Sc. ranks.

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in the future as there are only about 90 to 100 bed spaces per year for B.Sc. students at UDSM.

It is not possible to forecast with any precision how many mature entry students will be able to enter the Morogoro program. In the past some diplomas have proceeded on overseas studies for the B.Sc.. A new scholarship program in the offing (Phase II of the Training for Rural Development Project) indicates that more places will be available for such practitioners. This is very fortuitous. As Form VIers become increasingly available for the domestic B.Sc. places, deserving diploma practitioners will also continue to have the opportunity for higher studies.

As there is no way of knowing exactly what will occur, a simplifying assumption has had to be made for purposes of analysis. Exhibit IV-H (Rows C and D) assume that the overseas programs will probably be responsible for most diploma entries in the future; while the UDSM-Morogoro will probably take mostly Form VIers. Exhibit IV-H therefore depicts these parallel pools, percentage allocations or scholarships availabilities, and drop-out rates, before giving a combined output projection for the entire B.Sc. level.

c. Outputs (Rows F, G, and H)

There is no definitive basis for projecting international scholarship outputs after about 1983 for most donors. From 1983 to 1986 the U.S. funded Training for Rural Development Project, Phase II will be of considerable assistance. As this program is "probable but not yet fully authorized," its contributions have been included in the supply projections. Beyond 1986, a more moderate and completely arbitrary output level of 24 persons per year has been programmed.

One very encouraging aspect of the statistics is the strong growth of UDSM output. This growth is even more marked in the late 1980s with the increased availabilities of secondary school graduates in the sciences.

The drop-out rate is estimated by the Faculty staff to be about 6% for B.Sc. (and higher degree) levels. Unfortunately, detailed records were not readily

available to give complete verification; and therefore the rate must be considered tentative and in need of monitoring.

d. Cumulative Staff-Prior Year and Before Losses (Rows I and J)

(Accounting entry rows to demonstrate sequence in which calculations are made.)

e. Attrition Loss (Row K)

The 3.9% rate of attrition applied here was calculated in Exhibit III-H.

f. Loss to M.Sc. Ranks (Row L)

The losses to M.Sc. ranks are quite considerable in the 1980-86 period, ranging from 41 to 87 persons. This is because of a number of donor sponsored programs which have been and will continue to be in operation in the foreseeable future. From 1987 on, the figure of 40 per year is an arbitrary guesstimate.

g. Cumulative Staff and Net Growth Rates (Rows M and N)

The 1982-83 jump to 11% is due to the first outputs of the higher enrollments at UDSM, and the overseas scholarships. The small 1979-81 growth in staff is about an average of 34 persons, or 3.9% per year. The growth for the 1979-86 period is of course higher, at about 4.8% per year.

Discussion

There appear to be a number of points which should be considered, and they are closely interrelated. First, the production at UDSM will be coming close to, or exceeding physical facilities for students as estimated in the next section of this chapter (See IV-B). It is possible to consider higher domestic outputs after 1986 if investments in UDSM institutional capacity are made. However, as is well known, university level education carries high per student recurrent costs. And in the absence of major revenue increases, reliance on international training sites may well be best in the medium term.

Second, both Form VI and mature entry intakes to UDSM could be increased if the Faculty or the Education Ministry were to expand programs in supplementary math

and science studies to entering or aspiring students.

Third, it may be that with Form VIers taking up most of the places at UDSM, that mature entry candidates could be forced to rely primarily on international scholarships. This would probably not be convenient for some of them who may have particular family responsibiltiies and be unable to travel overseas. It would also remove an educative mix of practititoners and Form VIers from studying together; and it might prevent advanced study and career mobility by mature entrants if internatior -l scholarship availabilities should decrease.

Taken together, these factors tend to argue for a healthy mixture of manpower pool sources at UDSM. A solution to the issue of which persons should take up international scholarships and which should attend UDSM might be found in an examination of the technical specializations needed. Some will probably not be available at UDSM at this time; while some degreeof concentration in them could be achieved at overseas institutions.

5. Post-Graduate Diploma Supply Projections

Increases in PGDs have not been projected over the 1980-86 period. Only 2 to 9 such diplomas per year have been granted over the 1976-79 period. There are at present 35 PGDs in the sector. No information was uncovered which could indicate th scale of intakes or outputs in future years. While it seems likely that these diplomas will continue to be supplied, it was not thought possible to calculate their number with any degree of precision whatsoever. For the purposes of the study it is assumed that attrition will probably be equalled by any new outputs. Thus, the cumulative supply is expected to continue to be 35.

6. M.Sc. Supply Projections

As there is nothing especially complicated about this level, the exhibit's row by row coverage has been eliminated. A brief overview follows.

Both the B.Sc. and PGD staffs are the manpower pools for M.Sc. level training, as shown in Exhibit IV-I. The projected intakes to M.Sc. programs are based not on percentages of the manpower pools, but rather on the availability of internation scholarships and domestic places. The 1980-85 contribution of overseas study oppor tunities are quite considerable from a number of donor agencies. Even after a 6% drop out rate has been applied, there are 41 to 87 M.Sc. graduates expected per yea The exhibit contains projected output for 1983-86 of 14 persons per year under the aforementioned Phase II of the Training for Rural Development Project.

The domestic UDSM inputs and outputs are not based on detailed knowledge of graduate study plans. It is known that there are about 25-30 M.Sc. students presen enrolled. The exhibit's figures assume that this level will be maintained and increase only slightly.

Losses to the Ph.D. ranks are built on very fragile data indeed, and cannot be considered sure.

Discussion

Considerable growth is projected to take place at the M.Sc. level, especially

Exhibit IV-I

M.Sc. Level: Projected Outputs and Cumulative Supply

	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
A. B.Sc. Staff Pool[1]	708	663	686	668	740	792	853	907	945	984	1022	1058	1114
B. P.G.D. Staff Pool[2]	35	35	35	35	35	35	35	35	35	35	35	35	35
C. Intakes to M.Sc.-Intl. Schlshps.[3]	37	28	52	65	41	22	22	11	11	11	11	11	11
D. Intakes to M.Sc.-UDSM Places[4]	30	16	27	28	29	30	31	32	32	32	32	32	32
E. Total Intakes	67	44	79	93	70	52	53	43	43	43	43	43	43
F. Outputs from Intl. Schlshps.[3]	-	35	26	49	61	39	21	21	10	10	10	10	10
G. Outputs from UDSM Faculty Ag/Vet[4]	-	28	15	25	26	27	28	29	30	30	30	30	30
H. Total M.Sc. Outputs	-	63	41	74	87	66	49	50	40	40	40	40	40
I. Prior Year- Cumulative M.Sc. Staff[5]	-	143	190	222	275	332	370	391	410				
J. Cumulative M.Sc. Staff-Before Losses[6]		206	231	296	362	398	419	441	450				
K. Attrition Loss[7] (3.9% x J)	-	-8	-9	-12	-14	-16	-16	-17	-18				
L. Loss to Ph.D. Ranks[8]	-	-8	0	- 9	-16	-12	-12	-14	-14				
M. Cumulative M.Sc. Staff[9]	143	190	222	275	332	370	391	410	418				
N. Net Growth Rates		33%	17%	24%	21%	11%	6%	5%	2%				

Notes:
1. From Exhibit IV-H, Row M.
2. 1979 post graduate diplomas totalled 35. Projections of future growth were not made; and a steady state is assumed.
3. Fairly reliable through 1986; arbitrary level thereafter. A 6% drop-out rate has been applied.
4. No strong basis for projections except current enrollments 1979. A 6% drop-out rate has been applied.
5. From Row M, prior year. An accounting entry to ease calculations in columns.
6. J = H + I.
7. From Exhibit III-H attrition calculation.
8. From Exhibit IV-J.
9. M = J - (K + L). Projection beyond 1987 would have little empirical basis.

during the 1980-86 period. A 27% average annual growth rate is shown in Exhibit IV During 1981 and 1982 intakes are expected to exceed 10% of the total manpower pool. Whether this isactually possible to do should naturally be monitored closely. There may be two issues involved. The first is whether there are sufficient persons who will be able to meet M.Sc. entrance qualifications. The second is whether such large numbers can be released for additional training when present workloads are so great. There is the issue, of course, as to whether the sector can afford to miss such training opportunities.

Whether or not the UDSM should increase the size of its M.Sc. program to handle this level of training at Morogoro is another matter for consideration. As with the B.Sc. level, there are naturally high recurrent costs.

7. Ph.D. Supply Projection

The M.Sc. cumulative staff projections provide the manpower pool for the Ph.D. level forecast shown in Exhibit IV-J. The data at this level is weak at every point. About all that is known is that there arenow 12 persons in the doctoral program at UDSM and perhaps 12 overseas. Overseas scholarships are projected at the donor agencies' estimate of availabilities; while domestic places are seen increasing only slightly. The overseas scholarship projections include 5 persons per year being financed under the Training for Rural Development Project, Phase II

Exhibi IV-J

Ph.D. Level: Projected Outputs and Cumulative Supply[4]

	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
A. M.Sc. Staff Pool[1]	143	190	222	275	332	370	391	410	418				
B. Intakes to Ph.D. -Intl. Schlshps.	0	6	11	5	5	5							
C. Intakes to Ph.D. -UDSM Places	3	3	5	7	7	9							
D. Total Ph.D. Intakes	3	9	16	12	12	14							
E. Outputs from Ph.D.-Intl. Schlshps.	-	6	0	6	11	5	5	5					
F. Outputs from Ph.D.-UDSM Faculty Ag/Vet	-	2	0	3	5	7	7	9					
G. Total Outputs of Ph.D.s[2]	-	8	0	9	16	12	12	14					
H. Prior Year-Cumulative Ph.D. Staff	-	+33	39	37	44	58	67	76					
I. Cumulative Ph.D. Staff-Before Losses	-	41	39	46	60	70	79	90					
J. Attrition Loss[3]-(3.9% x I)	-	-2	-2	-2	-2	-3	-3	-4					
K. Cumulative Ph.D. Staff	33	39	37	44	58	67	76	86					
L. Net Growth Rates		18%	-5%	19%	32%	16%	13%	13%					

Notes:
1. From Exhibit IV-I, Row M.
2. Drop-out rate unknown and not applied (sic).
3. From Exhibit III-H attrition calculation.
4. Data is weak at this educational level at all points. Extreme caution should therefore be exercised with interpretations.

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B. Institutional Training Capacities

1. MATIs

Student capcities of the twelve MATIs are based on a 1978 analysis of the floor spaces of facilities conducted by the Division of Manpower Development. The capacities shown in Exhib tIV-K reflect the number of students who can be accomodated in the most limited facility of each MATI. An allowance of 1 square met (m^2) of classroom floorspace and 5 m^2 hostel floorspace per student was assumed. Using these measures, hostels were the most limiting facility in 10 of the 12 institutions.

For the purposes of this study, these assumptions are adequate. Obviously, detailed planning in the future will have to completely review and reassess the situtation at each institute.

a. Capacity Increases Planned

Exhibit IV-K shows the presently planned and funded increases scheduled from 1980 through 1982. A total of 275 additional places will be provided. This is a 14% increase over the present 1978 rated capacity of 1944, raising the capacity to 2,219.

b. Facilities Utilization

Exhibit IV-K also calculates the amount of over-and under-utilization that occurs at each institute. The 1979 underutilization is only 3%, with 1888 of 1944 places being taken.

However, some MATIs had enrollments well over the rate hostel capacity, which meant considerable overcrowding of students. "Overutilization" was at the 40% level, and occured at Maruku, Mlingano, Mpwapwa, Mtwara, Tumbi, and Uyole. Other MATIs were underutilized. These were CVL, Ilonga, Morogoro, Nyegezi, Tengeru, and Ukiriguru. With these latter institutes, the capacity underutilization was 25%.

Exhibit IV-K

Physcial Facility Capacities and Utilization, MATIs, 1978/79 [1]

MATI	Location	1978-1979 Enrollment	Facility Capacities 78	80	81	82	1978-1979 Over-Util.	Under-Util.
CVL	Dar Es Salaam	31	63					-32
Ilonga	Kilosa	117	134		+40			-17
Maruku	Bukoba	114	62				+52	
Mlingano	Tanga	62	53				+ 9	
Morogoro	Morogoro	83	102					-19
Mpwapwa	Mpwapwa	169	137				+32	
Mtwara	Mtwara	115	74				+41	
Nyegezi	Mwanza	249	307	+100				-58
Tengeru	Arusha	244	320					-76
Tumbi	Tabora	117	78				+39	
Ukiriguru	Mwanza	226	346					-120
Uyole	Mbeya	361	268				+93	
Usa River	Arusha	-	-	+35				
Kisulu	Kigoma	-	-		+50	+50		
		1888	1944	2079	2209	2219		
			Over/Under Rated Capacity				+266	-322
			Rated Capacity				672	1272
			Percent Over/Under Utiliz.				+40%	-25%

Note: 1. From Ministry of Agriculture, Manpower Development Division.

c. Comparison of Projected Intakes and Institute Capacities

Exhibit IV-L compares the expected intakes/enrollments of the two year courses with the projected student capacities of the institutes. As the table demonstrates there will likely be adequate capacity through 1986. Thereafter, additional facilities would be required to handle intakes.

There are two assumptions built into this table which should be made explicit:

(i) As noted earlier in this supply chapter, the projections made have been based prudently and conservatively on past allocative decisions and trends; and not on sectoral aspirations for the future. Therefore, if it is decided to raise allocations of Form IV and VI personnel to the MATIs for training, the urgency of expanding the physical facilities would become greater.

(ii) If the MATIs were called upon to participate more fully in short course training and farmer training (as a future chapter does in fact urge), the present underutilized capacity would disappear rapidly. The necessity of expansion would be brought closer then.

One interesting aspect of the capacity utilization figures in Exhibit IV-K is the overutilization of some facilities. These bear much closer investigation by an educational facilities planner, If it is possible to "stretch" the present physical plant without injury to students, teaching efficacy, or plant and equipment, then certain economies might be achievable.

The underutilization of facilities also bears scrutiny. The managerial factors leading to such a situation need to be better understood, and rectified where possible.

d. Lead Time for Facilities Construction

Consultations with manpower and educational planners were held to ascertain the lead time necessary to constructnew educational facilities. They advised that the following activities and likely completion dates are reasonable to expect.

Exhibit IV-L

MATI Institute Capacities: Projected Enrollments and Capacity Utilization, 1979-1992

	Acad. Yr.	80	81	82	83	84	85	86	87	88	89	90	91	92
A.	Approximate Enrollments[1]	1945	1852	1728	1774	1836	1919	2000	2093	2221	2373	2514	2633	2751
B.	Institute Capacities[2]	2079	2209	2219	2219	2219	2219	2219	2219	2219	2219	2219	2219	2219
C.	Over (+)/Under (-) Utilization	-134	-357	-491	-445	-383	-383	-219	-126	+2	+154	+295	+414	+532
D.	Percent Over (+)/ Under (-) Utiliz.	-6%	-16%	-22%	-20%	-17%	-17%	-10%	-6%	0	+7%	+13%	+19%	+24%

Notes: 1. Derived from Exhibits IV-D and IV-F. Total Intakes for each year have been summed for both certificate and diploma levels.
2. From a survey of faciliti-s by Ministry of Agriculture, Manpower Development Division.

Exhibit IV-M

Lead Time Estimates: Facilities Construction

	80/81	81/82	82/83	83/84	84/85	85/86
Project Authorization	X	X				
Donor Funding Arrangements (if any)		X	X			
Detailed Design & Planning		X	X			
Construction				X	X	X

As the chart shows, six years would be most likely; five years could be possible if any one step could be shortened by a year. The lengthy lead time involved in agricultural educational facilities expansion usually makes it imperative that planning begin early, that allocative decisions be known in advance, and that detailed physical surveys for design and planning purposes be initiated sooner rather than later.

2. Faculty of Agriculture and Veterinary Science: UDSM Morogoro

The present student capacity of the Morogoro campus is 375. This isbased on available hostel spaces. Twenty five of the 375 spaces have been used by the Regional Planning Institute. By the end of 1980, 160 additional hostel spaces will have been built. With the regaining of the RPI spaces and the new hostels, the total capacity will increase to 535.

In addition there are increased numbers of staff housing (36), a doubling of library space, the completion of the Center for Continuing Education, an expansion of the agricultural engineering workshop, construction of new greenhouses and completion of new offices and seminar rooms.

Out of the 535 student places the Agricultural and Veterinary Science Divisions are expected to fill about 435 places, with 100 or so going to Forestry Division. Therefore a comparison of projected intakes with institutional capacity would be as follows in Exhibit IV-N. This table demonstrates that UDSM-Morogoro's student capacity will be adequate through about 1985 or 1986.

This situation would have to be reassessed if allocations of Form VI graduate to university training were raised further; or if higher degree program intakes were to be expanded.

3. Overseas Scholarships

It is not possible to measure the physical facilities of overseas institution However, it is useful to consider some of the factors which affect theiravailabili of places. The first and most obvious limitation is the availability of fellowship funds in donor agency programs. These may vary greatly from year to year. The second is the occassional difficulty of identifying entrants able to meet foreign institutions' basic qualification standards. The third is the scarcity of places at some more developed country institutions, and at many developing country universities. This is unfortunate as the latter often (but not always) offer more relevant educational experiences. There are a number of developing

Exhibit IV-N

UDSM-Morogoro Institutional Capacity: Divisions of Agriculture and Veterinary Science, Projected Enrollments and Utilization, 1979-1991

	Acad. Yr.	80	81	82	83	84	85	86	87	88	89	90	91
A.	Approximate Enrollments[1]	347	412	424	425	430	438	443	447	471	520	569	594
B.	UDSM Capacity	435	435	435	435	435	435	435	435	435	435	435	435
C.	Over (+)/Under (-) Utilization	-88	-23	-11	-11	- 5	+ 3	+ 8	+12	+36	+85	+134	+159

Notes: 1. Derived from Exhibits IV-H, I, and J, from intakes rows.

country institutions where useful courses of studies can now be found in the agricultural field. However, the competition for places from the best nationals of those countries may limit the possibilities.

The longer run implication is obviously for the expensive but self-reliant development of domestic institutions; and the international transfer of technologies by visiting international faculty when necessary. The short run implication appears to be to make maximum use of available scholarship plans.

Chapter V: COMPARISON OF SUPPLY AND DEMAND

Chapter V: Comparison of Supply and Demand

When the interim summary report of September, 1979 was prepared the study team was unable to secure adequate secondary and university enrollment projections. This made definition of the likely supply situation very unsure. With the latest data in hand, that problem has been solved. Furthermore, the supply situation has changed considerably in just the last five months. As Chapter IV related, increased allocations of Form VI graduates to both diploma and university levels have been made.

Another contrast with the interim report is that the method of analysis has changed. The former was a static portrayal. The present analysis is not only based on the latest information, it is also dynamic in nature. Chapter IV demonstrated how it is possible to trace the flow of personnel through the educational system over time, and how this affects the net number of staff at each educational level in each year. Any subsequent policy or program changes affecting these figures can be calculated in the same way.

In this chapter, the updated supply information and the demand data from Chapter III are brought together for comparison. The objectives of the comparison are to:

(1) Demonstrate the overall gap between demand and supply, and the trend through 1991;

(2) Define the gap between presently projected supply and budget-constrained demand, as this is the "decision space" within which actions can be taken.

To complement this quantitative data, the next chapter (VI) will examine qualitative utilization factors which would affect decisions about agricultural manpower production. Then, in light of both the quantitative and qualitative data collected, Chapter VII will present guidelines and recommendations in response to the major question of the study regarding manpower production levels and the expansion of training institutions.

A. Overview of Supply and Demand

Exhibit V-A makes it possible to portray not only the comparison of supply and demand at each educational level; it allows a very significant picture comparing likely development between educational levels.

The basic pattern which emerges is straightforward.

- There will be continuing large demand/supply gaps at both certificate and B.Sc. levels. Both the certificate and B.Sc. levels are being heavily utilized to supply staff with diploma and M.Sc. qualifications, respectively.

- In all cases gaps widen before they begin to improve. Most of the significant movement in the closing of gaps occurs after 1986 when the ideal staffing pattern points have been reached; and staff increases then take place against a constant level.

- The projected sectoral net growth rate in agricultural manpower is 7.8% per year from 1980 to 1986; and about 8.4% from 1979 to 1991. Certificate and B.Sc. staff increases average only about 3 to 5 percent through 1991; while the other levels average 18% and above.* This reflects the fact that diploma, M.Sc., and Ph.D. gaps will be closing more rapidly than those for certificate and B.Sc. levels.

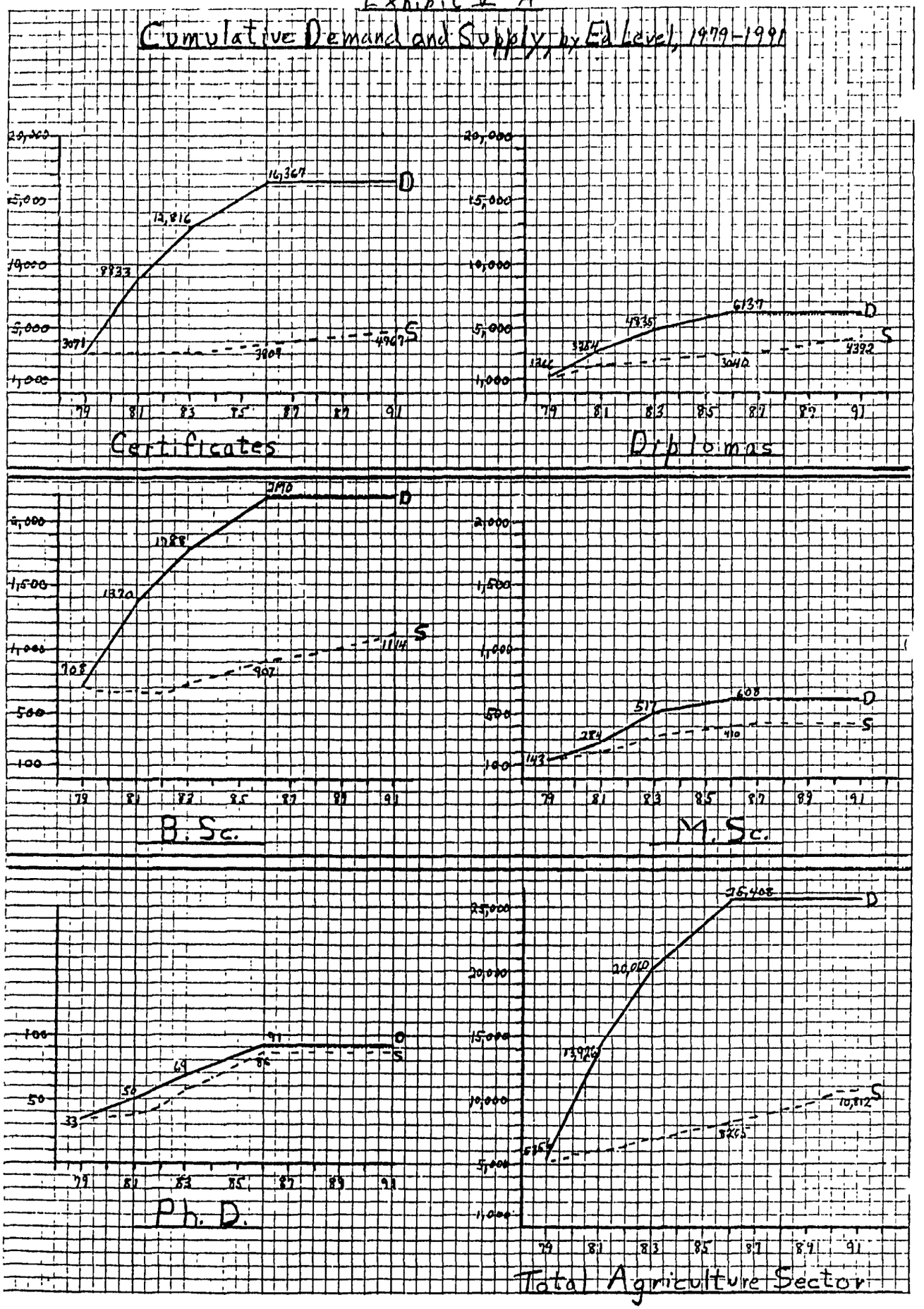
Exhibit V-B shows these same patterns from a slightly different vantage point. In this table, the supply and demand situation is compared by viewing the percentage of cumulative demand being fulfilled at various points in time. For all educational levels except that of the Ph.D., the declining percentage of fulfillment is evident at first. Then, after 1986 the trend is reversed. Supply begins to climb towards the ideal staffing pattern levels.

A further insight into the staffing pattern which is scheduled to emerge is revealed in Exhibit V-C. The actual staffing pattern proportions among educational levels which are likely to occur can be compared with those now existing, and with

*Projections for 1987 through 1991 for M.Sc. and Ph.D. levels are not made due to a lack ofadequate information. Their growth rates through 1986 are 27% and 23% respect as shown in Exhibit IV-A.

Exhibit V-A

Cumulative Demand and Supply, by Ed Level, 1979-1991



those proportions reflected in the ideal staffing pattern. The most noticeable shifts in percentages are those for the certificate and diploma proprotions. The more than 2 to 1 ratio of certificates to diplomas changes to almost parity in 1991 under the projections.

Exhibit V-B

Percent of Demand Being Fulfilled by Supply, by Educational Level, 1979 - 1991

Educational Level	1979	1981	1983	1986	1989	1991
Certificate Level						
Demand	-	8833	12816	16367	16367	16367
Supply	3071	3079	3209	3807	4346	4767
Supply Fulfilled as % of Demand	-	35%	25%	23%	27%	29%
Diploma Level						
Demand	-	3354	4835	6137	6137	6137
Supply	1366	2107	2445	3040	3785	4392
Supply Fulfilled as % of Demand	-	63%	51%	50%	62%	72%
B.Sc. Level						
Demand	-	1370	1780	2170	2170	2170
Supply	708	686	740	907	1022	1114
Supply Fulfilled as % of Demand		50%	41%	42%	47%	51%
M.Sc. Level						
Demand	-	284	517	608	608	608
Supply	143	222	332	410	418	418
Supply Fulfilled as % of Demand	-	78%	64%	67%	69%	69%
Ph.D. Level						
Demand	-	50	69	91	91	91
Supply	33	37	58	86	86	86
Supply Fulfilled as % of Demand	-	74%	84%	95%	95%	95%
Total Agricultural Sector						
Demand	-	13926	20060	25408	25408	25408
Supply	5356	6166	6968	8285	9692	10812
Supply Fulfilled as % of Demand	-	44%	35%	32%	38%	43%

Sources: Derived from Exhibits III-J and IV-A.

Exhibit V-C

Projected Staffing Proportions, by Educational Level, 1979-1991

	Ed Level	1979 Existing Staffing Proportions No.	%	Ratio	1981 Projected No.	%	Ratio	1983 Projected No.	%	Ratio	1986 Projected No.	%	Ratio	1989 Projected No.	%	Ratio	1991 Projected No.	%	Ratio	Ideal Staffing Pattern No.	%	Ratio
	Ph.D.	33	0.6		37	0.6		58	0.8		86	1.0		86	0.8		86	0.7		91	0.3	
	M.Sc.	143	2.6		222	3.6		332	4.7		410	4.9		418	4.3		418	3.8		608	2.3	
	PGD	35	0.6		35	0.5		35	0.5		35	0.4		35	0.3		35	0.3		35	0.1	
	B.Sc.	708	13.2		686	11.0		740	10.6		907	10.9		1022	10.5		1114	10.3		2170	8.5	
A)	AllProfs.	919	17.0	1	980	15.7	1	1165	16.6	1	1438	17.2	1	1561	15.9	1	1653	15.1	1	2904	11.2	1
B)	Diploma	1366	26.0	1.5	2107	34.1	2.1	2445	35.0	2.1	3040	26.6	2.1	3785	39.0	2.4	4392	40.6	2.6	6137	24.1	2.1
C)	Certif. OR	3071	57.0	3.3	3079	50.0	3.1	3358	48.0	2.8	3807	46.0	2.6	4346	44.8	2.7	4767	44.0	2.8	16367	64.4	5.6
D)	(Combined Certif. & Sub-Tech)	(7067)[1]		(7.7)							(6407)[2]		(4.6)							(18967)[2]		(6.5)
E)	Totals (A+B+C)[3]	5356			6166			6968			8285			9692			10812			25408		

Notes: 1. 7067 = Row C total plus 3996 persons in sub-technical cadre.
2. Row D totals = Row C totals plus 2600 sub-technical cadres expected to be in place in 1987; having allowed 5% attrition per year, and non-replenishment policy in effect by which sub-technical cadres become a phased-out group.
3. All figures derived from Exhibits III-J and IV-A.

B. Budget Constrained Demand and Supply Relationship

The large and temporarily increasing (but then narrowing) gap between demand and supply should not be unduly disappointing or disturbing. It is necessary to recall that demand is a projection of an ideal staffing pattern which managers would like to see. As mentioned in Chapter III, all respondents were fully aware that their aggregated projections would be subjected to a budget constraint. They understood that this would be necessary to ensure that adequate funds would be available to pay the salaries and operating costs of whatever additional manpower were to be produced.

In the exhibits which follow (V-D through H), the demand and supply graphs have had budget constraint lines added to them. The practical effect of the budget constraint is to define the feasible "decision space" between the constraint line and the presently projected supply line. The constraint line defines the maximum number of personnel at each educational level who could be hired under the projected authorized establishment. The fact that the budgetarily determined establishment levels are far above the supply lines in all cases demonstrates that the manpower availability constraint is a far more limiting factor than that of money. The budget constraint line indicates that if more manpower could be produced the sector would be able to hire them.

The interim summary report of September, 1979 posited that the budget constraint was the primary constraint on increasing agricultural manpower. It therefore laid out the scale of training intakes which would be necessary to close the "vacancy gap" between authorized establishment and cumulative supply. This temporary working assumption has now been shown to be incorrect. The manpower problem can now be redefined as a matter of supply shortages.

C. Closing the Vacancy Gap: Decision Space and the Supply Shortage

With the principal constraint to closing the vacancy gap being a supply shortage the practical question becomes by how much can and should agricultural manpower

supplies be increased. The "can" side of the question is controlled by the budgetary constraint. The "should" side of the question is controlled by decisions as to the allocation of scarce national manpower resources.

The former involves accuracy in the calculation of the budget constraint lines. Concern is expressed about this in a subsequent section. On balance, however, whatever adjustments are made, the present constraint lines are quite useful at a sectoral level of analysis. Determination of the exact budget constraint for any particular organization or group of end users can be done after the submission of this report. What is clear is that funds are budgeted each year for a larger number of staff than can be found.

The allocative decision aspect of the question is a less quantitatively calculable matter. It is a national planning decision based on the strategy by which national political and social goals are to be achieved during a particular period of time. Such a strategic calculation would normally reflect where national leadership feels the country will benefit most from an investment in and allocation of scarce human resources.

This study does not pretend to know how such resources should be shared amongst the sectors. Its terms of reference were to provide information which national decision makers can use in their deliberations; and to make recommendations for and within the agricultural sector. The study team did not analyze the comparative returns or benefits of allocating scarce manpower to agriculture as opposed to other sectors. Therefore, it would not po-sess the empirical data to make such arguments.

What the demand and supply information collected do demonstrate is what will likely occur over the next two plan periods. This is based on the fundamental factors in the situation, and the trend of decisions and events which have been described. The graphs in Exhibits V-D through H depict the decision space within which alternative growth paths in supplies could be designed. Each alternative would imply higher allocation of personnel to the agricultural sector from the limited

manpower pools; and a commensurately smaller allocation to other sectors.

The study team's judgements on these issues and the criteria by which they have been arrived at are given in Chapter VII. It is sufficient here to define the decision space within which policy makers can make better informed decisions.

D. Methodological Issues in Budget Constraint Setting

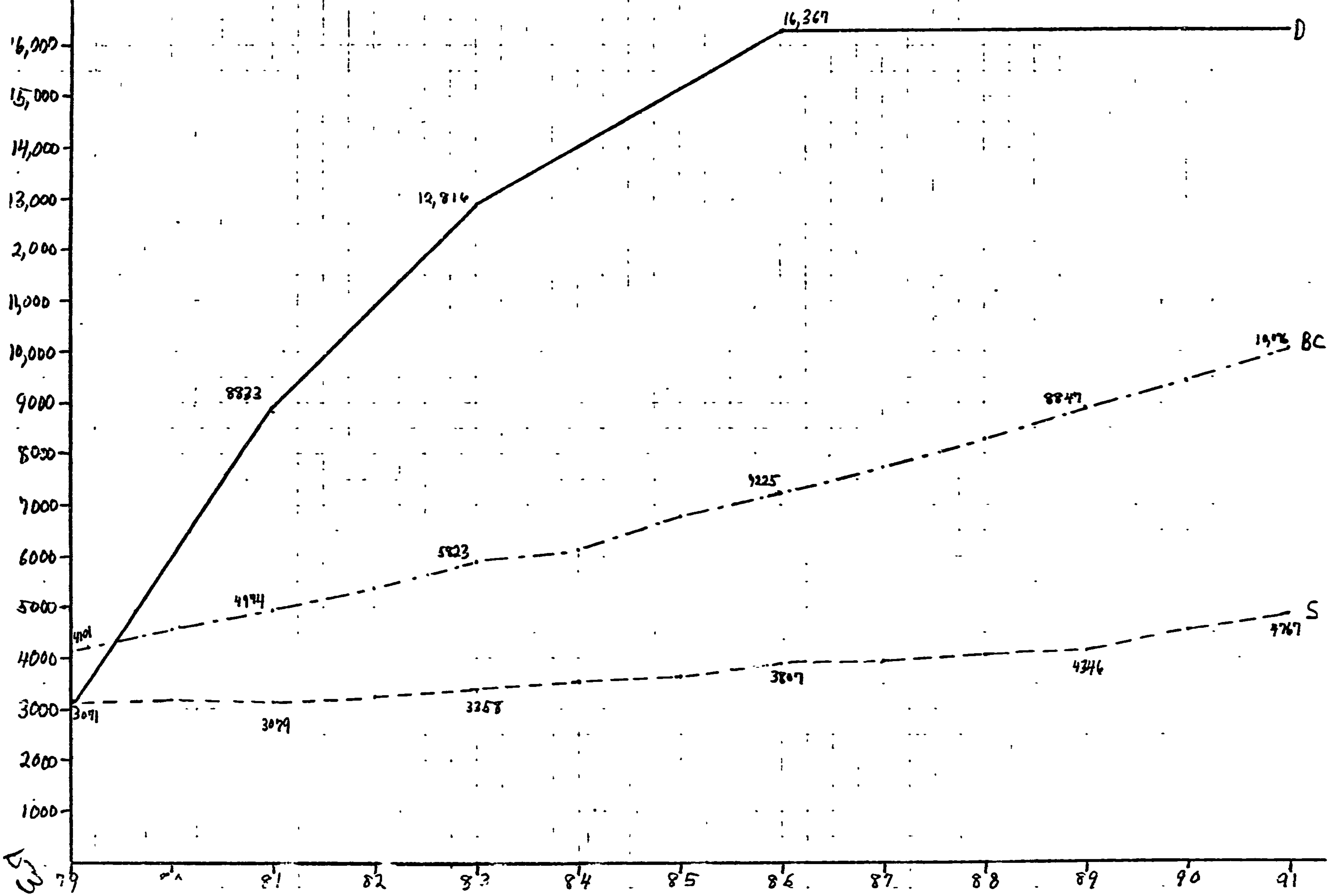
Knowledge of the budget constraint will be useful when it comes to making a final determination as to allocation of manpower resources. There are a number of methodological problems in the setting of the budget constraint, and these are discussed below.

First of all, authorized establishments are set by position rank (such as professional officer, field officer, agricultural field assistant I and II), and not by educational levels. This analysis has had to convert position ranks to education levels. In practical terms this has meant assuming that all AFA II authoriz establishments are for certificate level graduates, all AFA I and FO positions are for diploma graduates, and all professional officer slots are for degree graduates. This does not distort reality too much, but it is a simplification in some ways. (See Exhibit III-B for details of higher degree personnel).

The second and more serious assumption is the manner of projecting increases in authorized establishments. The study team followed the Ministry of Finance (recurrent estimates) officials' stated method of setting authorized establishment levels. They indicated that the authorized establishment increases each year by the number of outp produced from the agricultural training institutions. For example, with regard to the certificate level, Exhibit III-B indicated that the 1979 establishment was 4,101 compared with 3,071 filled posts. The budget constraint line is then projected from the annual MATI graduating classes found on the projected supply chart (IV-D). This means, in effect, that the number of budgeted positions is always running well

Exhibit V -

Certificate Level



Diploma Level

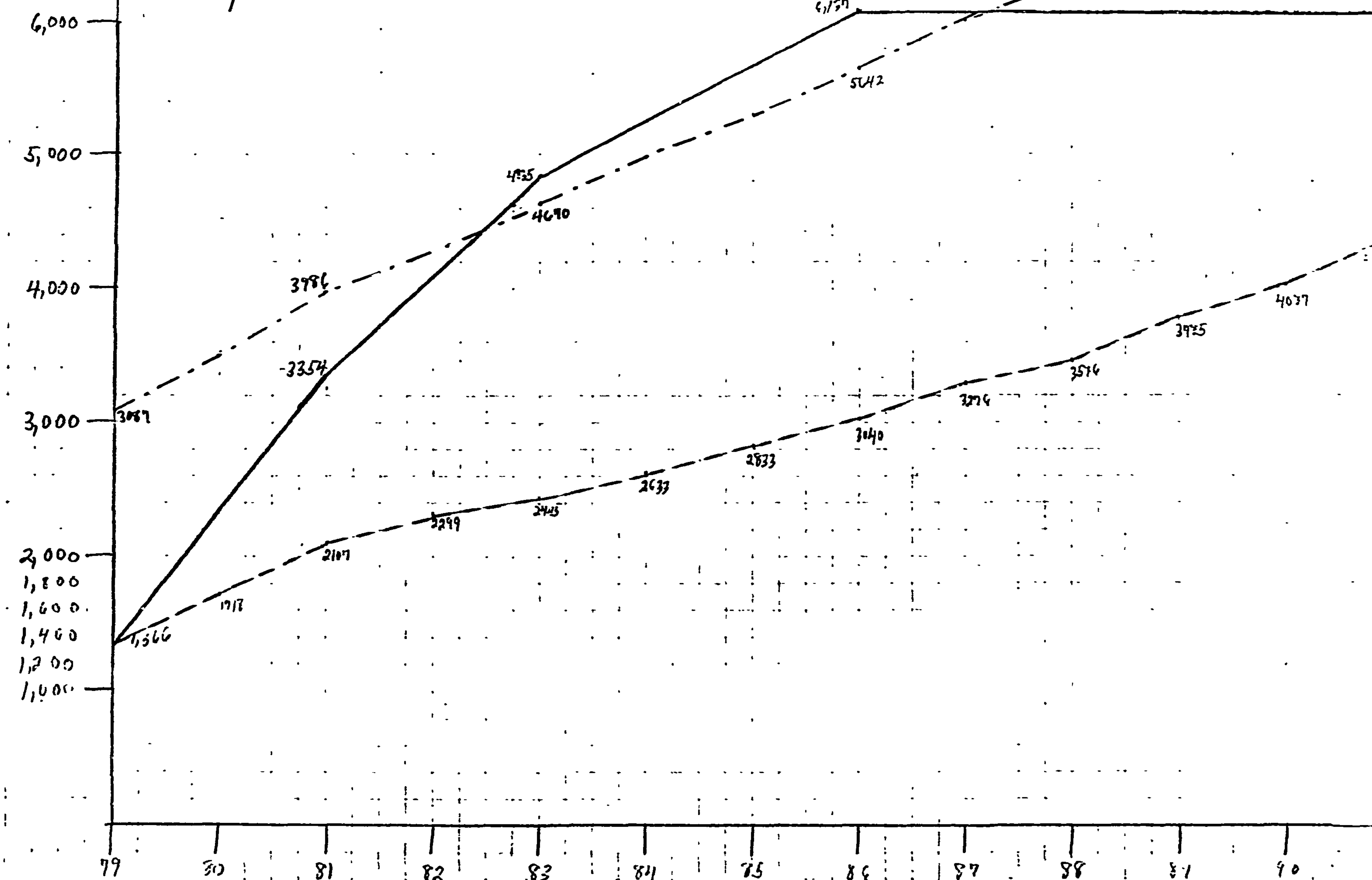
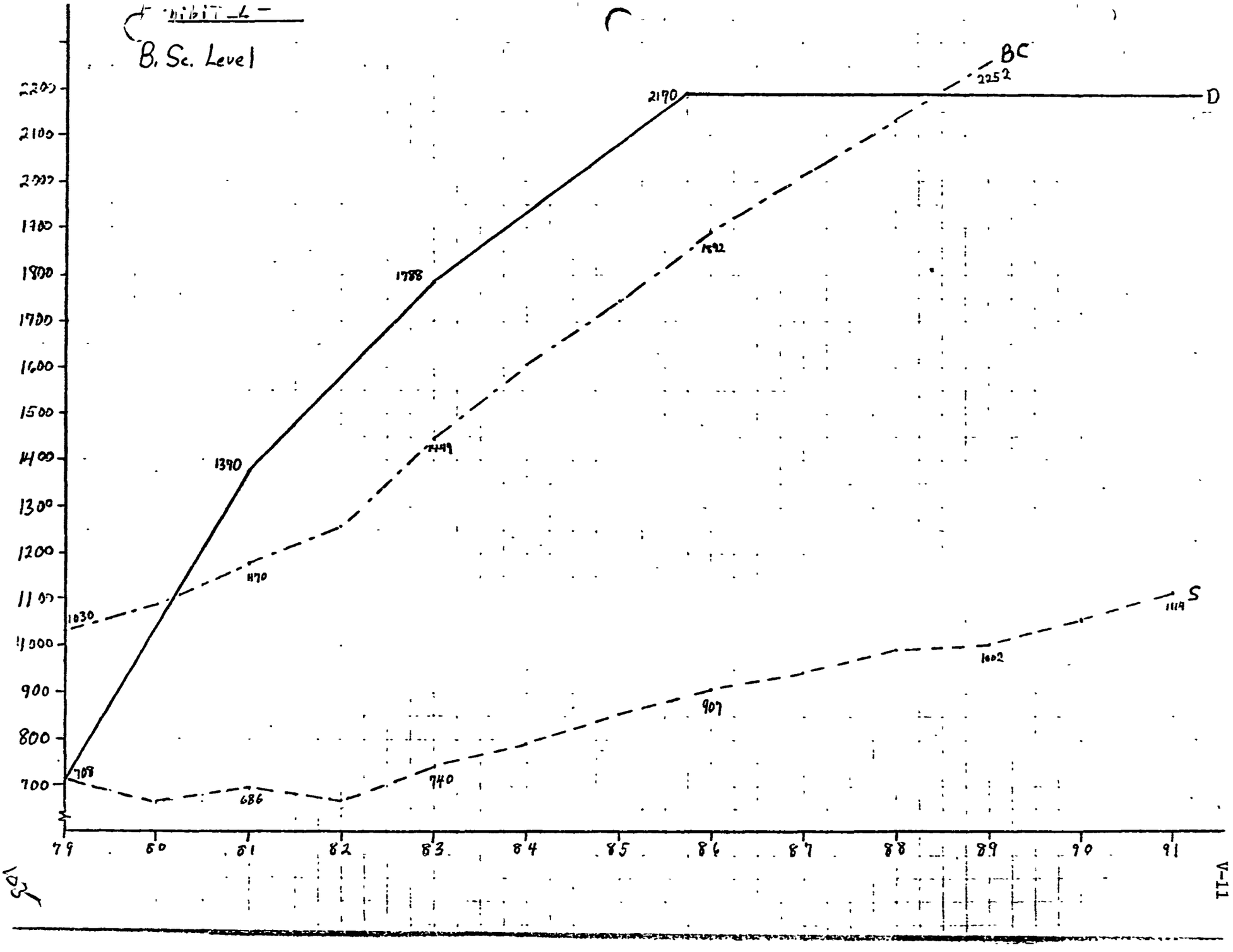


Exhibit -L-

B. Sc. Level



V-11

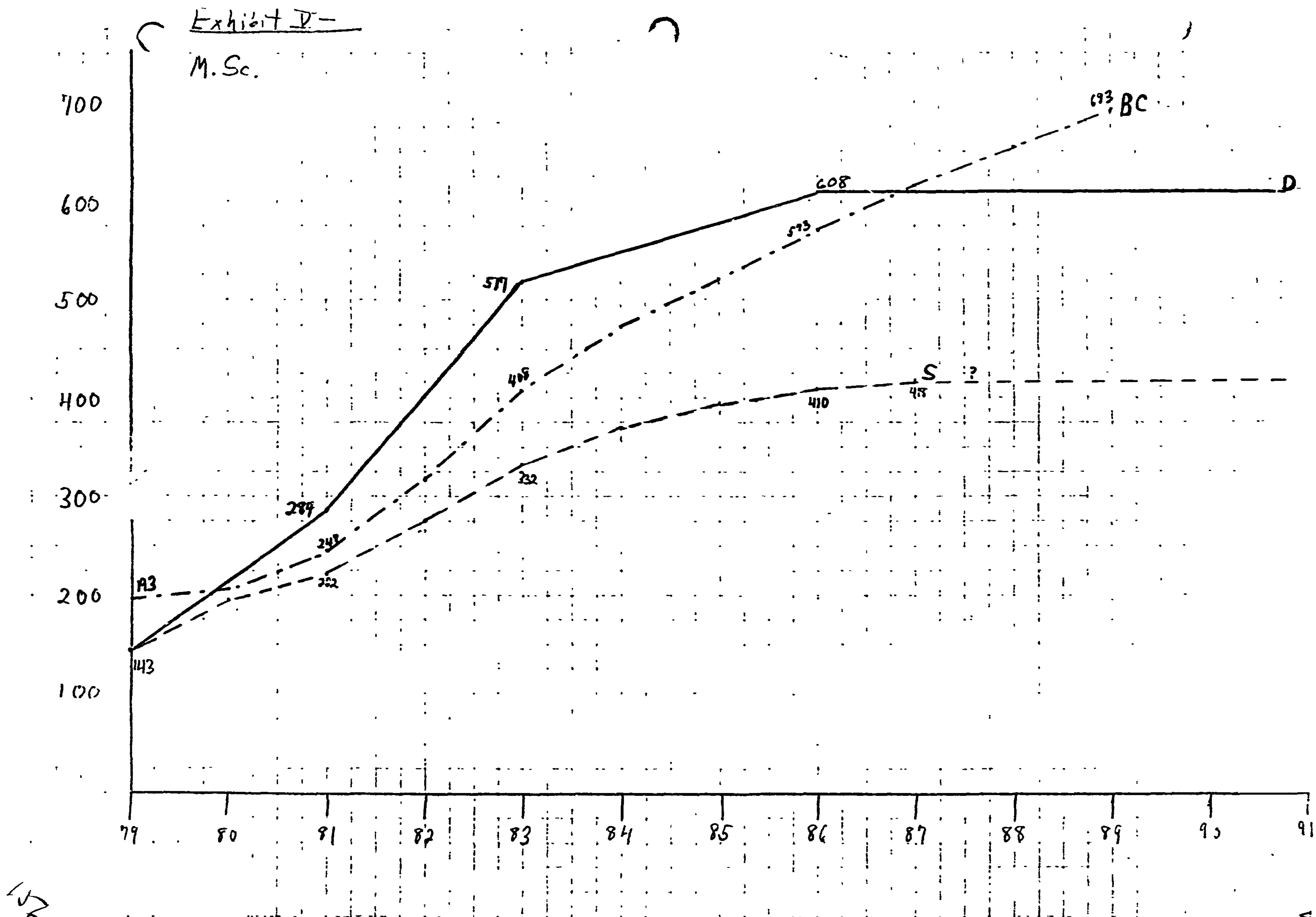


Exhibit V-
M. Sc.
700
600
500
400
300
200
100
BC
D
S
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85
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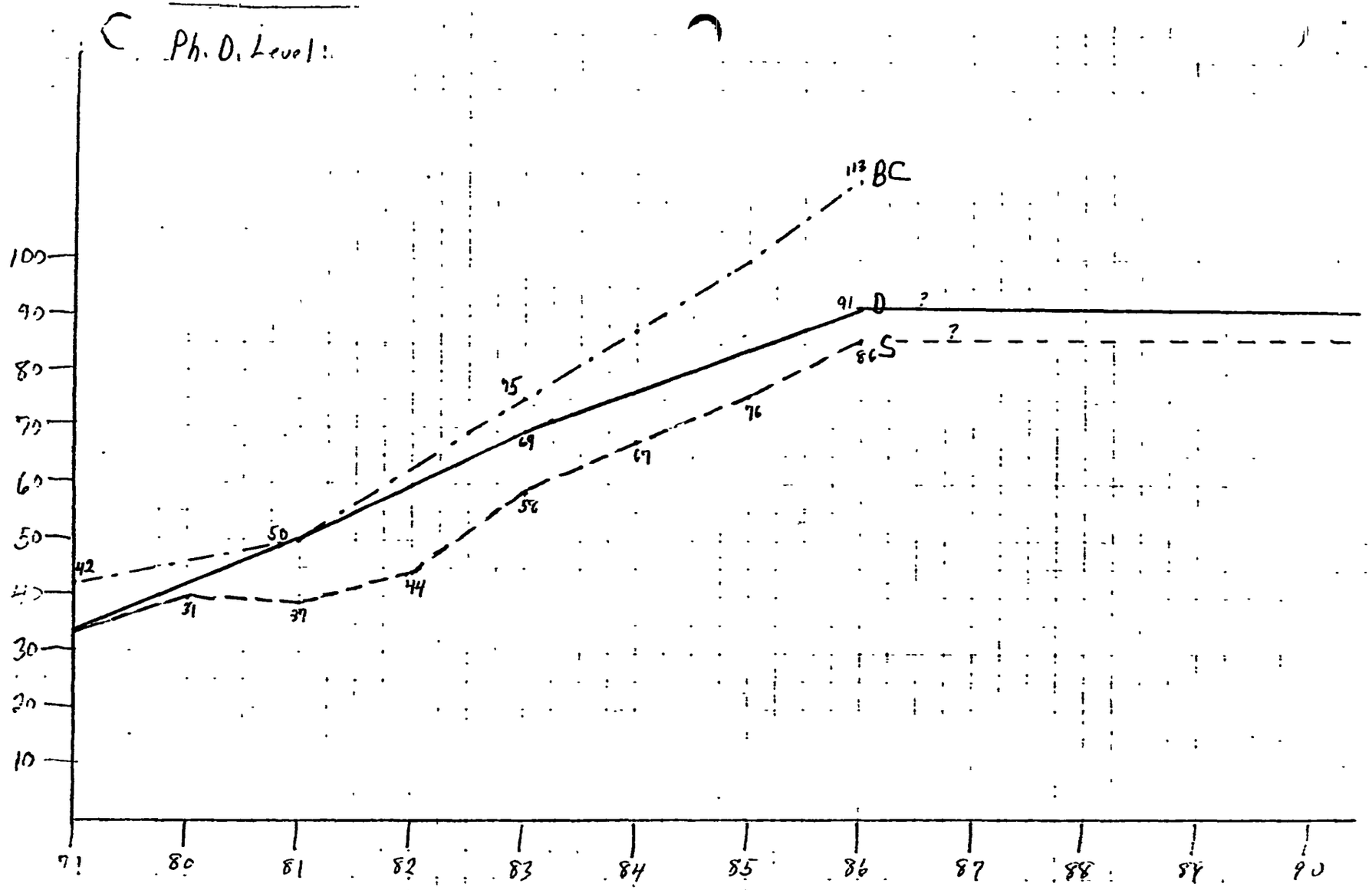
89
90
91

C. Ph. D. Level:


BC
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113
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67
76

ahead of the annual supply of newly trained personnel. To close such a "vacancy gap" between the budget constraint and the supply line, normally means a vastly accelerated and enormouly larger expansion of training operations, physical facilities and course intakes. The interim report used this approach and demonstrated a need for a more than doubling of many facilities in a very short period of time!

A third problem is caused by the dynamic flows of personnel through the system. Again, the certificate level can serve as an example. The 1980 certificate graduates total 444, but the losses to attrition and diploma ranks are 418, making for a net gain in cumulative staff of only 26. Despite this, the budget constraint line moves higher by 444 persons, creating a wider and wider gap with supply.

A fourth problem in the methodology is not terribly serious, but it should nonetheless be mentioned. The analysis assumes that parastatals, the private sector, and the UDSM (who together have 23% of existing staff), do their authorized establishment calculations in the same way as government. If they do not do so, the budget constraint may be a bit high.

A fifth and potentially the most serious issue, is a practical budgetary matter. The amount of funds authorized but not expended on personnel is normally utilized elsewhere. It is not automatically assured, therefore, that all or what portion of such funds could be made available when and if needed. Obviously, any move to close the vacancy gap would require prior agreement and close coordination with Finance officials.

Chapter VI: UTILIZATION ASPECTS OF MANPOWER PLANNING

Chapter VI: Utilization Aspects of Manpower Planning

Utilization analyses attempt to discover many of the factors which impinge on the efficiency and effectiveness with which manpower is and could be used. For example, many specific questions were asked of respondents on efficiency and effectiveness matters in the survey, and additional interviews and reviews of the literature were done as a part of the study. The aim was to identify problems and bottlenecks which have affected work performance in the agricultural sector.

Two types of findings were discovered: (1) those that affect the quantitative and qualitative aspects of manpower production decisions (i.e., how many personnel should be produced at what levels in which specialties, when and be deployed where); and (2) those that indicate how manpower could be better organized, coordinated,supervised, motivated, financed and supplied for their research, planning, training and extension functions. This chapter is only one of two on the utilization subject. This chapter reports findings relevant to manpower production decisions. A later chapter (VIII) takes up the types of improvements which could be helpful to consider in the future.

A. Utilization and Manpower Production

A manpower planning study oftentimes has the unintended side effect of creating a momentum of its own in favor of extensive manpower production. The gaps stand out clearly, and everyone seems to be in favor of closing them. The implicit assumption appears to be that more and better manpower will solve the problems. This is undoubtedly an oversimplification and a partial truth at best.

Many factors other than the quantity and quality of manpower naturally enter into the equation for stimulating agricultural development. This was well recognized by the Ministry of Agriculture in the terms of reference for the study team. They specified an inquiry into the efficiency and effectiveness with which manpower is utilized as a part of the study. They recognized that the mere provision of additional numbers of better trained personnel are probably a necessary but not sufficient condition for advancing agricultural development. It was understood that it would be a waste of the people's

money to expensively educate, hire and deploy thousands more staff if they would not have much impact on farmer production and productivity. For these reasons, information was gathered on a number of utilization problems; and an analysis was made to determine if helpful recommendations could be put forth.

In section B which follows, a general introduction to utilization is given. It is followed by a discussion of the findings from the technical and economic dimensions. The managerial and organizational aspects of research, planning, training, and extension functions are found in Chapter VIII, as noted above.

B. Utilization Dimensions

The utilization analyses examined:

1. Personnel matters, such as the promotions system, insufficiency of numbers of staff, staff transfers, staff allocations, drainage to non-agricultural work, vacancies, and the role of women;

2. Organizational structures and functions, such as the chain of command, clarity of roles to be played, communications systems, span of control, central-region-district-village relations, etc.;

3. Logistical systems, including roads, transport, credit, supply inputs, at times and places needed, including information flows;

4. Financial systems, including cash flow timing and absolute amounts;

5. Planning/programming processes, for deciding on what to do, and then the implementation programming activities;

6. Community involvement, including mobilization of individual communities and citizens to contribute their knowledge and skills.

These analytic dimensions were applied to the four major activities in the agricultural sector:

7. Research - the process of discovering what is technically feasible and economically viable to recommend to farmers;

8. Organizing, Planning and Programming - the process of linking research,

extension, training, technical support, parastatal and managers/planners together to (a) contribute to improved national, regional, district and village decisions on what should be done, and (b) contribute to the programming and scheduling of how much money, how many persons, and which materials should be allocated to do which tasks, when, where, how and how much lead time is required to arrange it all.

9. Training Agricultural Personnel - the process of educating staff most of whom will be involved in extension, at long formal and short course levels.

10. Extension - leadership, supervision, work programming and scheduling field agents, monitoring performance, providing on-job training, subject matter support, and general coordination of field efforts.

The application of the managerial dimensions to the agricultural development activities yields a number of findings with which most all agriculturalists and administrators are familiar. There are serious shortages of men, money, materials, organizational coordination, improved planning, and community involvement. These insufficiencies hinder seriously the effectiveness and efficiency of research, planning, training and extension operations on a daily basis.

There are various conclusions drawn by agriculturalists and administrators about what to do, based primarily upon whether they are researchers, managers/planners, trainers, or extensionists.

The researchers perceive that their ability to contribute to agricultural development could be enhanced by:

- more senior and intermediate staff to run experiments
- more vehicles, travelling allowances, and petrol
- more technical equipment and supplies for facilities
- more laboratory staff
- more autonomy from traditional governmental structuring
- attaching an extensionist to research institutes
- carrying out some farming systems research to cover both technical and socio-economic dimensions.

The organizers and planners tend to perceive that they could function more positively if:

At MOA headquarters --

- more senior staff were provided
- the regions and districts were not so sensitive to direct communication channels, and to central technical support
- there could be some degree of centralized direction and control of extension operations
- farmer training centers were opened again.

At regional and district headquarters --

- more staff were provided in allocations
- more vehicles, travelling allowances and petrol
- more discretion to communicate freely among functional managers and ministry technical support personnel
- less time taken up with administrative and political meetings called at the last moment
- greater availability of input supplies
- quarterly allottments were neither equal nor late
- more control of own vehicles
- less frequent transfer of staff
- training were provided in agricultural administration and practical economic analysis

The trainers tend to perceive that they could do better if:

- tutors were more highly qualified
- quarterly allocations were what they originally were supposed to be
- syllabi were shorter and more focused on major job duties
- transport and petrol were more available
- some consolidation of institutes took place to allow larger facilities and more efficient staff:student ratios

- teaching equipment and supplies were more plentiful
- tutors received training in teaching methods
- student involvement in farmer outreach programs increases
- the balance among self-reliance activities and educational activities could be successfully reached.

The extensionists tend to perceive that they could do better if:

- supervisors had four wheel drive vehicles, and adequate petrol
- ward supervisors had motorcycles, and extension agents had bicycles
- travel allowance money for coordination and on-job training meetings were available in adequate amounts
- each village had a Bw/Bi Shamba
- more staff subject matter specialists were available at district and ward levels
- careful work programming were done with each agent, with proper supervisory direction and leadership
- short courses and additional on-job training were given to agents
- training in how to give proper supervision and leadership were done
- certificate personnel could be upgraded by attending diploma courses
- telephone and letter communications between district, ward and village levels were easy and rapid
- extension agents were better trained in extension methodology
- agents were not used by the village leaders for functions other than agriculture (and were not attracted to performing broader socio-economic roles)
- agents had more hands-on practical experience based on being farmers or having been farmers.

All respondents seemed to feel that they could do a better job if:

- staff transfers were less frequent
- promotions were more frequent
- agricultural staff were not drained to help other rural efforts
- farmers would only listen to agriculturalists.

Implicit in these recommendations are investments in many different aspects of agricultural development, from additional people through increased operating expenditures to capital equipment and supplies. However, given the present and projected recurrent and capital account shortages, it is obvious that any expenditures should be very carefull analyzed.

C. Technical and Economic Dimensions

For properly balanced increases in food, cash crop, and livestock production and productivity, a number of conditions must be satisfied at the same time. Otherwise, some bottlenecks will occur to prevent success. Most agriculturalists are probably familiar with A. T. Mosher's common sense book on Getting Agriculture Moving. Mosher cites five essentials and five accelerators of agricultural development, as noted below:

Essentials

(1) New technology - that is feasible in farmers' conditions, and with their managerial capacities;

(2) Markets - that reliably demand products, and in which farmers have confidence;

(3) Supplies - that are available, on time and at right places, tested as effective, and known as economically profitable to use;

(4) Transport - to carry input supplies in, and take products out to market on timely basis, at economic rates;

(5) Incentives - prices that give a fair return to individual or communal producers, based on their labour and cash inputs;

Accelerators

(6) Extension - to inform and sell ideas to, and train farmers;

(7) Credit - for inputs;

(8) Group Action - cooperatives for economical services provision;

(9) Land Development - roads, irrigation, etc;

(10) Project Planning - skills to analyze investments and program implementation.

Therefore, before making any specific recommendations as to whether an investment in additional manpower should be undertaken, it is advisable to ascertain whether some of the essentials of agricultural development have been met; and which essentials are

the most important in a local situation. As will be noted, extension personnel are an accelerator only.

Without such an analysis, the application of the effectiveness and efficiency perspectives to agricultural activities will not likely lead to genuine improvements. It might lead to considerable wastage in fact. If the agricultural development system of technology, markets, supplies, transport and incentives are not sufficienctly present, then no amount of tinkering with personnel numbers, organizational structures, financial arrangements, community involvement or planning processes is going to have much effect.

In soliciting the views of agriculturalists, economists, planners, and other observers on these matters, a number of pieces of information were gathered. These are noted below; and it is upon their analysis that the question of whether the nation should invest in more manpower, how much, at which levels, in which specializations, and where deployed should be based.

A consensus exists among many observers on the following facts:

1. Diversity of agricultural natural resource base. This diversity can be broken down into hundreds of micro-climates, based on soil conditions, water and rainfall reliability, topography and so forth.

2. Population Location. Most of the people are located in medium and lower potential dryland areas, not in the higher potential better rainfall and soils areas.

3. Blanket recommendations for crops are frequently inapplicable. Because of the diversity of the people's local environments, and their locally determined farming patterns (e.g., intercropping, etc.), most blanket recommendations are not valid. This is the reason why farmers resist changing their farming behaviors in part.

4. The majority of farmers are rational farm operators. Studies have been conducted which demonstrate that farmers have changed, and would do so further when and if they could increase their profits while maintaining essential security of food supplies and minimizing risks of loss.

5. Transport is frequently not available. If farmers cannot count on timely inputs and

crop evacuation, risks become unacceptable. The recent food crop problem is probably a case in point.

6. Supplies are not always timely or of sufficiently low cost. Studies have revealed that some recommendations for fertilizer use in certain areas have been inaccurate. Even when available on time, a farmer may resist inputs for which he or she does not have the cash; or which may put him/her in debt beyond reasonable repayment capacity, or for which the promise of adequate returns in the local area would be insufficient to justify their use.

7. Incentives. As revealed in the recent food crop increases, farmers are responsive to price. However, given the lack of technology in increasing productivity of both food and cash crops in a balanced way, they created the increases by switching out of cash crops and into food through land extensive methods.

Given the individual ingredients of the situation described above, the following general situation is thought by observers to prevail:

- For the vast majority of areas in the country, there does not presently exist an adequate body of technically reliable and economically viable recommendations to communicate to most small scale farmers.
- The present recommendations (even where scientifically accurate) are not within the managerial, cash and labour availability constraints facing most small scale farmers.

To the extent that these contentions are true (and there is nothing in the literature reviewed or respondents' ideas which gives evidence contrary to these propositions), then a number of deductions can be made to clarify many aspects of the agricultural situation.

First of all, the lack of agricultural production and productivity progress is not due to lazy, traditional, change resistant farmers as some have suggested. This is not to deny that some people aren't lazy, suspicious of change, and slow to adjust. However, care must be taken not to mistake the part for the whole.

Second, extension agents are not to blame for not having communicated well and convinced farmers to adopt so-called modern innovations. In any large group of people in a dispersed field organization, there are bound to be some lazy and ineffective

extension educators; but that problem is not the principal one.

Third, training will not solve the problem of absent viable recommendations. Neither would improvements to the management systems recommended in this report solve the agricultural bottleneck, desirable though they may be as improvements.

Fourth, improvements in personnel incentives, administrative coordination, information flows, organizational linkages, local participation, and so forth are not necessarily the priority bottleneck breakers.

Fifth, improved extension work programming and control devices for extensionists will probably not pay off in most (but not all) areas at this point in time.

Sixth, improvements in supplies, transport, and prices are always to be desired; but for many areas their presence might not necessarily mean certain progress.

Seventh, each of the various micro-climates needs to be looked at empirically to determine valid recommendations appropriate for local conditions. These local conditions should be examined from technical, economic, and socio-cultural perspectives.

Eighth, farmers are generally speaking sensible; and have a considerable store of common sense information about their local areas which could contribute to proper experimentation as to what works under local conditions. To ignore these potential contributions would not appear rational.

Ninth, in any particular place at any one time, any one or more of the essentials for agricultural development may indeed be the critical ingredient. The aforegoing observations are not meant to deny the utility of each essential component in agricultural efforts, but only to demonstrate that a viable technical and economic recommendation must exist for the other components to make their contributions felt. These factors are needed in a particular logical order of application in order to reap the full benefits.

The general contentions put forth here are not meant to deny the existence of recommendations that are eminently sound and appropriate for certain crops in particular areas. There are indeed instances of progress to be found. Where advances in production and productivity have occurred, farmers have found suitable ways of integrating modern

innovations into their household economic and social systems.

The most widespread testament to the astuteness of many farmers is the obvious success in the cash crop field over many decades. The historical progress in coffee, tea, cotton, and tobacco demonstrate the clear ability of farmers to learn, change, and respond to economic incentives and improved financing methods. Studies of these experiences prove how the provision of the "essentials" and some "accelerators" do in fact work.

Obviously, there are important lessons to be learned from both failures and successes. In the following chapter, those lessons are applied to the issue of agricultural manpower production.

Chapter VII: MANPOWER PRODUCTION GUIDELINES

Chapter VII: Manpower Production Guidelines

This chapter attempts to respond to the major quantitative question in the terms of reference:

> "2. Given a set of manpower needs, how many persons can and how many persons should be produced in light of various constraints such as funding levels, general economic outlook, or other significant factors?"

The preceding chapters presented the principal data on demand, supply, and utilization factors upon which a rational decision can be based. The comparison of demand and supply, and the budget constraint discussions indicated the general range or decision space within which production decisions could be made. The utilization materials demonstrated the many other factors which need to be considered when coming to a decision. The remainder of this chapter attempts to state the logical conclusions which can be drawn from the data, and the actions which top management should consider.

MATI System Expansion

Recommendation No. 1: The institutional capacity of the MATI system should be expanded by no later than 1986/37. This will enable the system to handle enlarged certificate intakes of students from the Form IV pools who will be increasing over time. It will also permit the even larger intakes which will be possible due to the increased Form VI pools. These latter would begin entering diploma programs in 1988.

The size of the expansion should be about a 25% increase at a minimum. This would allow an increase in capacity from 2,219 to 2,774, or 555 student places. This level would ensure that there is adequate room for expanded intakes through 1992, given the present set of projections. It would also provide adequate spare capacity for expanding short course trainining of existing staff until full capacity is reached. The spare capacity which will exist over the 1980-86 period can be similarly utilized as will be urged in future chapters.

If the expansion is to be achieved by 1987, it will require the initiation of the project planning cycle almost immediately. This is because of the six year lead time

required for authorization, funding, design, and construction phases.

Certificate Level

Recommendation No. 2: Certificate intakes should not rise above their presently projected level at this point in time. As indicated in the utilization data, empirical studies indicate there are few viable recommendation packages for contact agents to communicate in many areas. This is especially true for a majority of small farmers, and for the more than 50% of the population that lives where primarily dryland farming is practiced. Successful recommendations for these areas have not yet been evolved, generally speaking. While there are indeed individual recommendations that have technical accuracy which do prove out on research institutes, and are practicable by wealthier farmers, they are not widely relevant. There are not yet integrated packages of improved agricultural technologies which fit the cash availability and labor constraints of most farmers. Until these are evolved there does not appear much sense to expensively train and deploy more personnel in such areas. To place personnel in situations in which they have relatively little of value to communicate to farmers wastes a great deal of money. It also serves as a demoralizer of the staff who become frustrated and cynical on the job. More importantly, it reinforces farmers' perceptions that however well-meaning Government may be, it has little agricultural information that is presently relevant to the farming community's practical problems. The utilization analyses indicated that farmers are as rational (and as irrational) as the rest of humanity; and that they will normally alter their practices when it is clearly feasible, of minimal risk, and in their economic interests to do so. When they don't change, further investigation normally turns up sensible reasons. Unfortunately, these explanations usually emerge only after a great deal of time, money and effort has gone into expensive programs.

To blame the farmers for being stupid, uneducated, lazy or resistant to change in most of such situations merely displaces responsibility from those who are public

servants on to struggling farmers. This is understandable as a short-term psychological reaction to frustration after long sincere efforts. It is neither helpful nor acceptable from a professional point of view, as it misses the essential truth of the situation. The fundamental situation is that technological improvements in dryland agriculture are long and difficult to uncover. The main answer is always the same -- renewed, expanded, and vastly improved quality of efforts.

The tendency to point fingers and seek scapegoats for frustratingly slow progress should naturally be resisted by all. Most professional agriculturalists know from history what a long, technical struggle it has been to advance as far as the agricultural world has come. And they know that many breakthroughs are fragile, as new insects and diseases always seem to come along to challange hard-won progress.

The obligation upon professional managers of agricultural development is obviously to direct attention to evolving technically, economically, and socially profitable and practicable technologies that fit the conditions of farmers in the country's diverse agro-ecological zones. It is for this reason that more funds spent on additional certificate staff production are not felt to respond to the facts of the agricultural situation <u>at this point in time</u>. Such funds would obviously be better allocated to the practical investigation and examination of what technological packages would be appropriate. For such a task, there is relatively far less need for certificates, and a relatively far greater need for personnel at higher levels.

The greatest need for certificate personnel is when there are known, verified, and acceptable packages of improvements to be spread widely amongst farmers. At <u>that</u> time, production of certificate manpower will have to be vastly expanded. It seems likely that expanded production of certificates would be called for in another 10 to 15 years when the fruits of inquiries are beginning to emerge. In the meantime, two approaches would probably be helpful. The first would be to deploy more of the existing staff to those agro-ecological zones where their work can genuinely produce helpful results, other things being equal, such as costs, prices, weather, transport, etc. The second

is to better utilize the existing sub-technical cadres whose employment is far more cost-effective. This would probably mean considerably expanded and enhanced short course and on-the-job training for them in the future. Such issues are dealt with in the subsequent utilization improvement and agricultural education chapters. It is sufficient to mention them here to indicate that maintaining the presently projected certificate output does not imply inaction or lack of alternative strategies to deal with the hard and fundamental issues.

It may surprise some people that the report does not advocate a vast and rapid expansion of certificate ranks. After all, it is the policy of Government to reach a service ratio of one Bw/Bi Shamba to one village. As explained, the report does not dispute this goal. In fact, it supports what field managers say, which demonstrates a need for about two contact agents per village. The difference is in the question of timing. It is felt that the relative emphasis in manpower production should be placed elsewhere at this point in time. The situation is not a very different situation from from the hard choice made some time ago in the education sector. The nation chose to concentrate on primary and technical education up to a certain point in time when resources can be shifted to other areas of need. In the same way, proper sequencing of agricultural manpower production by educational level is seen as a critical factor. The difference is that the educational sector possesses known, tested, and viable technologies in mathematics, physics, sciences, languages, and so forth to communicate. When such knowledge is not yet uncovered as in the agricultural sphere, attention has to be given to higher levels of training first. After the discoveries are made, then more "extension" educators can be hired to spread the information.

It is well recognized that social and employment imperatives could require some increases in certificate and/or diploma intakes at some point. This would imply an expansion of MATI system capacity beyond the presently recommended 45%. Should such an eventuality occur, the study's supply methodology indicates the sequence of calculations which should be undertaken. Exhibit IV-L indicates the spare capacity available due

to underutilization for the 1980-86 period which could be devoted to additional students in the short term.

With knowledge about the maximum space availabilities, the situation should then be discussed with the Ministry of Manpower Development. They would examine whether their present 3.5% allocation of Form IV leavers could be raised and by how much. For example, an increase to about 4.7% would enlarge intakes by an average of about 200 persons per year.

Recommendation No. 3: The quality of certificate intakes should be raised by securing higher priority ranking in selection access to the Form IV manpower pool. This ranking should then be maintained. Such a change would result in greater efficiency in the educational process, lowered costs, and higher outputs. The lower drop-out rate would also be able to satisfy a few more end user demands than would otherwise be possible.

Diploma Level

Recommendation No. 4: Diploma intakes should continue at the presently projected level. However, the number of intakes from Form VI should be steadily raised as a proportion of total intakes. Intakes from certificate ranks can be allowed to decline in line with Form VIer increases to the point where a 50/50 ratio is achieved.

This would be desirable from a number of perspectives. First of all, it would provide the diploma ranks with higher quality staff and the farmers with potentially more useful advisors. A proportion of these staff would then be able to progress through to B.Sc. level training. Secondly, the declining drain on certificate level ranks would mean greater stability and continuity of personnel in the villages.

The total output of diploma personnel could probably not be raised more quickly without either taking more certificate intakes than would be prudent; or without securing vastly higher allocations from Form VI ranks. As diploma ranks are scheduled to grow at 18% per year under present projections, a further increase does not seem to be justified.

Perhaps the most important role of diplomas in the future might be the field supervision of expanded practical farming systems investigations to test and uncover viable technical and economic recommendations. For such work, field experience and a higher level of specialization are most desirable. The rapid expansion of diplomas is therefore fully justified in light of the technical tasks which have to be performed in the coming decade.

B.Sc. Level

Recommendation No. 5: The allocation of Form VI graduates for B.Sc. level agricultural training should be increased as rapidly as possible. A larger share of those with principal passes in the sciences and maths would be required as well.

In general the greater allocation of development funds to the agricultural sector which has occurred in recent years will need to be matched by a commensurate rise in human resource allocations. The main reasons for this are;

(1) With experience over time each organization's supervisory management ranks would be improved on average by personnel with higher technical and planning/programming capacities;

(2) Subject matter specialists with greater depth to adapt general recommendation to the circumstances of particular micro-climates are needed;

(3) Additional personnel to carry out expanded technical and socio-economic investigations are needed; and

(4) An expanded pool of B.Sc. personnel needs to be provided so that some of them can be sent off for M.Sc. level training.

M.Sc. Level

Recommendation No. 6: The very high level of production scheduled at the M.Sc. level should be allowed to occur, as long as intakes of appropriate quality can be released from their current assignments. If this cannot be done, a few years' delay

can be allowed until a larger pool of personnel with more adequate standards can be assembled.

There are two major reasons why the M.Sc. level assumes such importance at this time. First, the highest priority for the next decade or so will be in expanded conventional agricultural institute research; and especially in vastly expanded applied field investigations. These will be required to uncover and test the practicality of various technical and economic recommendation hypotheses, especially (but not only) for dryland farm areas.

The second priority at the M.Sc. level is to turn out more of the senior managers needed in the next 20 years. These should be persons with the personal growth capacity to assume increasingly higher technical and managerial positions in the regional, ministerial, and parastatal organization ranks. While such talent does not only emerge from higher education, the natural capabilities of many staff can be enhanced by such education. The challanges in the areas of sector policy, research design, agricultural planning, implementation programming, and operations administration are of such magnitude that they demand the nation's very best.

Ph.D. Level

There are no recommendations to be made at this level. Survey respondents were generally realistic in their demand for such personnel. Most recognized that the actual need for such personnel are limited, cannot always be programmed, and tends to occur in certain specialized fields such as crop breeding and a few others. There was full recognition of the high cost in time and money for doctoral graduates. Most research institutes felt that M.Sc. personnel would be quite adequate for the work; and that experience working with senior mentors was the most important factor in skills development beyond the M.Sc. level.

UDSM-Morogoro Expansion

These manpower production recommendations raise questions regarding further expan i(of the Faculty of Agriculture and Veterinary Science. More detailed educational policy a institutional capacity planning will be required. Therefore, Recommendation No. 7 is set forth. A high level working group of financial, educational, planning, agricul· tural, and end user organization representatives should assemble to consider higher agricultural education issues. Their advisory report could be made due in about six months. To expedite the compilation of background research, and preparation of papers, a full time but short term specialist in this area could be requested of donor agencies. Such a specialist would assist the chairperson of the working group and its members, and serve as a secretariat for the effort.

Questions have arisen over the present low capacity utilization of the B.Sc. prog:a while many students are at overseas institutions. While 90 to 100 places are available, 1980 intakes totalled only 33 persons. At the same time, at least 35 persons went on overseas B.Sc. (Agriculture) training. It seems likely that inappropriately stringent and outmoded entry qualifications have caused this inefficient situation.

Closely related issues which need to be addressed are: the possibility of remedial programs for entrants without adequate preparation in the maths and sciences; the advisability of adding another year to the presently overcrowded B.Sc. (Agric.) program to allow proper and adequate learning time (as is done in other fields and countries); curriculum development and teaching methods improvements; the size, scope and balance among M.Sc. and Ph.D. program offerings; and recurrent costs coverage and possible role: of donors. Other items for inclusion in such a study could be found in the chapter on agricultural education. However, the critical area for consideration at this time are the basic expansion questions. A subsequent working group could consider the issues which flow from the manpower production decisions.

Specializations

Recommendation No. 8 counsels that the number of personnel who should be trained in each specialization should generally follow the proportions indicated in Exhibit VII-This will mean some increases and some decreases in production proportions amongst and within crop, livestock and other agricultural fields. The unconstrained demand figures from which these proportions were derived also indicate that an attempt at

Exhibit VII-A

Manpower Production Guideline Proportions by Specialty Groups and Educational Level, 1980-1986

Specialty Group	Percent				
	Certif.	Diploma	B.Sc.	M.Sc.	Ph.D.
Crops-General	55.8	26.2	39.9	18.5	15.5
Crop Breeding	0	0.3	0.8	2.2	10.3
Crop Protection	1.5	1.1	2.1	3.7	6.9
Horticulture	3.1	5.6	2.9	1.1	0
Soil Science	0.6	0.4	1.3	3.2	6.9
Animal Science-General	8.6	15.4	6.8	10.8	8.6
Animal Health	16.5	14.3	0.3	0.9	0
Animal Nutrition	0	0.1	0.1	2.2	3.4
Animal Breeding	1.1	1.2	0.4	1.5	0
Range/Pasture Mngmt.	0.8	2.5	1.6	3.9	0
Hides and Meat	1.1	1.6	0.5	0.9	0
Veterinary Sci.-General	0.0	0.4	12.5	11.4	5.2
Vet/Technical Specialties	0	0.2	1.2	8.6	12.1
Agricultural Economics	4.9	11.8	12.0	9.9	3.4
Agricultural Engineering	1.9	6.2	5.2	3.2	5.2
Irrigation	2.4	5.7	7.3	9.0	1.7
Home Ec/Food Science	1.5	6.0	2.5	3.0	15.5
Agric Extension Admin.	0.2	0.5	0.3	0	0
Agric Education	0	0.1	1.4	3.7	1.7
Research-General	0.1	0.6	0.8	1.9	3.4
Miscellaneous	0	0	0	0.6	0
	100.0%	100.0%	100.0%	100.0%	100.0%

Notes: 1. Table derived from unconstrained demand figures, 1980-1986. See Appendix

some greater degree of specialization of studies is desired by end users. Close consultation should naturally occur amongst manpower planners, qualified entrants, educational institutions, and end users on these matters. It will be important to insure that a balance is struck between the individual student's interests and the needs of the agricultural sector for skills in certain areas. The end users and sectoral manpower planners should normally specify the programs to be undertaken by individuals, and insure that the institutions attended can offer the required courses. The domestic educational organizations must necessarily do their best to be responsive to the changing needs of the sector, or risk becoming irrelevant. The harmonization of the interests of students, educators, planners and end users can be accomplished with good will and frequent collaboration. Proper monitoring by the manpower planners will of course be required annually to assess the situation.

One specialty requiring careful attention is the field of agricultural economics. Recommendation No. 9 urges greater attention and priority in producing personnel who could contribute to an understanding of the small farmers' cash, labor, and management constraints. As these factors seem to predominantly determine farmer responses to recommendations, such personnel would be required for realistic research designs, baseline data collection, the site testing of alternatives, farm/household management planning advice, district and regional planning, extension operations that analyze costs and returns, and so forth.

Allocation of Domestic Places and International Scholarships Amongst End User Organizations

There are, unfortunately, insufficient domestic places and international scholarships to satisfy the genuine and well justified needs of each end user organization. Chapter III's specialization section (D) indicated that undue attention should not be given to just large requests, nor to so-called equitable distribution of personnel by specialty field or organization. As with all allocative decisions, diff cu

choices will need to be made based on a judgement of what will best serve national needs in the coming years. There is a logical sequence of investments in manpower production which should be followed at this point in time.

Recommendation No. 10 therefore gives priority to those organizations and their sub-sections that will be performing adaptive and applied research functions in both the technical and socioeconomic fields. This would include not only the research institutes, but the parastatals with research units, and those regions and districts and other organizations which will collaborate closely in practical farming systems investigations.

Obviously, "priority" does not mean monopolization of either domestic places or international scholarships. It is also unlikely that any group of organizations could afford to release so many people at any one time, or would have enough qualified candidates to fill every opportunity. In addition, many end users have scholarship opportunities for their staff which are tied to certain donor-assisted projects. What is being stressed in this guideline is that additional allocations should be made whenever possible to those end users who will evolve viable recommendations for farmers in the future. To complement this suggestion, increased levels of investment in agricultural research are counseled elsewhere in this report; and increased allocations of graduates to the principal institutions involved is advocated.

Chapter VIII: MANPOWER UTILIZATION IMPROVEMENTS FOR EFFICIENCY AND EFFECTIVENESS

Chapter VIII: Manpower Utilization Improvements for Efficiency and Effectiveness

A. Introduction

The earlier chapter on utilization and manpower planning described how utilization inquiries seek ways of improving the efficiency and effectiveness with which manpower is and could be used. Those aspects which impacted on the quantitative demand and supply findings were included in Chapter VI, and were further reflected in the production recommendations in Chapter VII. The present chapter relates those utilization findings which affect actual work performance in two spheres of agricultural sector activities. These are:

1. Technical Agricultural Functions
   a. Research
   b. Planning and Programming Processes
   c. Training
   d. Extension Operations
2. Administrative Support Functions
   a. Organizational Structures and Coordination
   b. Logistics
   c. Finance
   d. Personnel

Performance in each functional area was examined from the perspective of both policy direction and program activities. Information on both problems and suggested solutions was gathered through the survey's questionnaires, and extensive follow-up interpretive interviews. This information was then compared with many of the writings on Tanzanian agricultural development and administration, and the international literature in the field. From all of these sources, a series of guide-

line recommendations were compiled. Not all issues could be dealt with in the present study which naturally tends to focus itself on the quantitative manpower planning and educational matters primarily. Subsequent utilization analyses will be required to go into greater depth as appropriate. Nevertheless, a number of critical problems in which progress can be made are covered here.

In the immediately following pages a review of the utilization findings from Chapter VI is made. This leads into the major discussions of policy and program issues on which recommendations are given.

B. Utilization Overview

Ultimately, agricultural development is the result of decisions taken by individual and communal farmers to change their practices. Farmers do not produce more or increase their productivity per acre or labor hour unless they can minimize their costs and risks, and maximize their gains. Their calculations involve the need for capital, labor, markets, prices, credit, timely inputs, and transport, as well as consideration of their natural resource base of soils, rainfall, pests and disease potential, and even how any changes might affect social and political obligations and relationships.

Many explanations have been put forth to explain why most farmers in the nation have not altered their management decisions (to accord with Government's wishes) about what to produce, how to produce it, how much, when and where. These explanations range all the way from the supposed inadequacies of extension agents to lack of road maintenance and low cost transport facilities, not to mention poor training, insufficient research studies, lack of ministry support, lack of trained planners, insufficient roads, unclear organization structures, and so on and so forth. Depending on the particular area and crop or livestock endeavor,

any one or more of these explanations may indeed be accurate. The country is very large, very diverse, and each place has experienced one or more of such shortcomings alone or in combination on a number of occasions.

Those knowledgable about the micro-economic situation in Tanzanian agriculture seem to agree on one point. For most of the country there is an absence of technically feasible and economically viable recommendation packages to communicate to farmers. Even if there were good roads, marketing arrangements, inputs, knowledgeable extension personnel, adequate transport for supervisory personnel, proper work programming, and so forth, many farmers would still not change their practices. The absence of opportunities for making a surplus for the smaller farmers appears to be the single most important factor underlying the long term downward trend in agricultural productivity and production. All other shortcomings contribute to this perhaps, but the root cause remains the same. Development planners and agriculturalists have not often been able to put together a set of improved practices, price policies, and supporting services which are technically feasible and economically viable for the farmer.

There have been a number of successful cases in the past involving cash crops, principally. However, the more common case is an example of failure. These are instructive, nonetheless. A classic case in Tanzania, but also in Africa more generally, is a set of cotton planting dates, fertilizer and pesticide applications. Hull, Saylor, Collinson, Kirkby, Keregero, and De Vries have documented the Tanzanian example well. The needed early planting times for maximum cotton yields interfere with the planting times for essential food crops. To peasant farmers on the subsistence margin, there is no question which crop will receive the most attention. Food security is the highest priority. Fertilizer applications not only cost more money than most farmers would be willing to get into

debt for, but fertilizer also has the side effect of enhancing weed growth. Even if fertilizer is free or subsidized, the farmer is courting disaster unless there is adequate family labor to carry out extra weedings. The seemingly "progressive and modern" adoption of an improved practice can not only cause farmers to get into debt over their heads; they might not be able to reap the rewards if their labor availability or cash to hire labor is insufficient. And if they live in a highly unreliable rainfall area (which farmers know best about), they are altogether justified in rejecting the so-called "package". To make things worse, some recommendations have been advocated for areas in which verification trials had never been done, and with predictable results.

The Tanzanian experience is somewhat comparable to the situation in northern Nigeria. There, an analyst compared the standard recommendations for cotton and what they would mean for the average farmer with what the farmer's actual management decisions were under the cash, labor, rainfall and soil types situation he/she faced. A linear programming model with these simple constraints built in for an average sized farm demonstrated that the farmer was fully rational in rejecting the package. Risks were minimized and gains were maximized -- precisely because most farmers were able to shrewdly analyze their own situations better than most.

In the course of this study one DADO was asked which crops were being given emphasis in his district's extension work. He replied that pyrethrum was the most important, but that the farmers were not "cooperating". When asked which crops returned the greatest profits, he indicated that potatoes did; and that most farmers unfortunately preferred growing potatoes rather than pyrethrum. When asked which crops he would personally grow if he were a farmer, he responded "potatoes, of course".

Attention was drawn to his individual common sense, as contrasted with the official extension campaign. He immediately saw that the farmers were making a very sensible choice, and that the campaign would show the Government in a very poor light. The Government would not appear to have the farmers' best interests at heart, nor would it appear to be even minimally rational. In addition, who would ever listen to extension agents if they gave advice that would make farmers poorer than they could otherwise be? It is understandable then if some extension agents could be viewed by farmers as parasites on the society, rather than as fellow workers in a common struggle.

Many development planners and agriculturalists are unable to perceive the farmer's point of view on these matters. Many professionals tend to see the situation from their own specialty area's perspective. And each tends to think his or her perspective is the critical ingredient in improving a situation.

In covering the range of opinions on explanations for the less than sterling performance of the sector, a variety of observations come to light. It appears true that the extension service does not have adequate numbers and qualities of personnel, that it lacks transport for district and ward supervisors to back up contact agents, that extensionists are weak in communication methods, that proper work programming and control is not followed, that motorcycles and bicycles are needed, that improved coordination at the village level with Party and village council is necessary, that on-the-job and short course training is required, that better teachers, teaching materials, and methods and facilities should be put in place at MATIs, and so on.

It is often true that district and regional planners with a sense of the village realities are in short supply, that there is a lack of

ministry support for regional and district activities, that research institutes do not tie in well with extensionists, that researchers don't always ask the most relevant questions, that researchers don't get out enough to talk with farmers, that parastatals dont coordinate closely enough, that staff transfers at the supervisory level are too frequent, that promotions are few and far between with adverse effects on morale, that there are too few women to work with women cultivators, that some RADOs and DALOs have sometimes been forbidden to communicate directly, and that there is sometimes an inability to distinguish between policy/administrative issues and technical ones.

It is true that the input, credit, marketing and most other systems do not work well enough for the vast majority of people in rural areas. In addition, political scientists, sociologists, anthropologists, and community developers see poor educational work, insufficent grass roots mobilization, violation of cultural values and norms, ineffective approaches to working with rural peasant communities, and inter-cultural insensitivity.

It is also true that extension personnel tend to see the problem as an extension, manpower and logistics problem, trainers as a training problem, planners and administrators as financial and organizational problems, and researchers as research problems. And, of course, each view is accurate to a great extent. Each perspective shares a part of the very complicated reality. And each believes that an allocation of more men, money and materials would help to set the situation right. Each group is sincere, well intentioned, articulate and committed as they grapple with their problems. And many should be complimented for the genuine progress that is made in dealing with such problems.

In any complex endeavor such as agricultural and rural development, the solutions are usually multifaceted, requiring innumerable improvements

in many areas over a longer time than most people are willing to admit. It is a human tendency to attack all of them with equal vigor. Unfortunately, the human, financial and managerial resources for dealing with all these difficulties at one time are extremely limited. In the face of this dilemma the practice is still to attack the enemies along a broad front, investing some scarce funds and effort in each aspect of the problem. Because of this, sufficient force is seldom able to be marshalled at any one point to make a break-through. Part of the reason why funds are committed over so many efforts is the natural counter pressures in bureaucratic organizations. Decision-makers at each level want more resources, and wish to support their subordinate personnel to accomplish their goals. They wish to avoid saying "No" to their staffs out of sympathy with their efforts, to avoid discouraging them, and quite frankly to avoid confrontations and being continuously nagged about things.

In addition, there are the normal and powerful socio-political pressures for continuing investments in each geographic area, which is common to any strong democractic country. The citizenry and their representatives naturally feel that there must be equitable distribution of development efforts.

These altogether understandable pressures result in a number of effects; first, by spreading resources too thinly to make significant breakthroughs in critical areas sooner rather than later.

Second, without the concentration necessary, the number of years to achieve progress is immeasurably lengthened, and people at all levels become impatient and disillusioned.

Third, the thin spread of resources over too many improvement efforts ignores the essential logical sequence in which agricultural development efforts must proceed.

Fourth, the reluctance to concentrate means a wastage of funds and energies, for improvements in one area will not often result in production and productivity unless preceded by essential prerequisites in other areas.

Fifth, dispersal does not allow concentration to help those areas in most desperate need (for example, the dryland crops/livestock areas of medium and low potential).

Sixth, dispersal means wastage of the people's money, in the sense that it does not produce anything for them. They lose respect for what they know is absurd advice, and become cynical and disillusioned about the future. Their capacity to mobilize themselves and to be mobilized in larger national efforts becomes less.

In such a situation it is important to work logically towards the solution of the problems defined. Otherwise, additional scarce resources are going to be wasted. Most (but not all) areas suffer from the following:

- Lack of viable technologies, which implies that more research is needed.

- Lack of planning skills to determine what should be done, as well as the managerial programming skills to set out which activities will be done at what cost, by whom, when, where, and how.

- Lack of properly trained and sufficient numbers of agents to carry out the programmatic activities.

- Lack of adequate supervisory work planning and control of contact agents delivering the services to the public.

The logical sequence of overlapping stages is shown in Exhibit VIII-A.

Exhibit VIII-A

Logical Sequence for Technical Agricultural Functions Performance

Technical Agricultural Functions	Time------>
1. Research	(Viable recommendations evolving)
2. Planning/Programming	(To be scheduled for implementation)
3. Training (Pre/IST/OJT)	(By properly prepared agents)
4. Extension Operations	(Carefully concentrated and supervised)

At each of these stages, there must naturally be supportive administrative/organizational activities for coordination, finance, logistics, and personnel. Exhibit VIII-B diagrams the relationship between the administrative support system and the technical functions.

Exhibit VIII-B

Interrelationship of Administrative Support and Technical Agricultural Functions

	Technical Agricultural Functions			
Administrative Support	Research	Planning Programming Processes	Training	Extension Operations
Coordination	X	X	X	X
Finance	X	X	X	X
Logistics	X	X	X	X
Personnel	X	X	X	X

The situation any particular region, district, ward or village is in, will vary with their own peculiar agricultural problems. Most suffer from all the problems, to a greater or lesser extent, as noted earlier. Therefore, it is possible to make some broad suggestions as to the types of policy

guidelines and programmatic activities and investments that could respond to the issues raised.

In the following sections, policy and program suggestions are made which should be helpful in making progress. They represent the best judgements available about what will raise the effectiveness and efficiency with which manpower is and can be utilized.

C. Research Policies and Programs

As noted in the manpower production guidelines chapter, research was judged to be that stage which needs priority attention at this point in time. While it is difficult to make generalizations which can stand every test, the principal utilization finding is that the research function should receive the highest priority for agricultural investment funds by Government. For the past decade or so the research sub-sector has received a declining amount of funds with which to operate at precisely the time when technically and economically viable recommendations are most needed by farmers. The literature on agricultural development in both more and less developed countries shows amongst the highest returns being attributed to investments in agricultural research. In addition, there is the example of the higher income nations whose growth has often been based largely on the surplus accumulated by the agricultural sector and that growth is well correlated with agricultural research in part.

Thus, Recommendation No. 1: advocates the priority commitment of men, money, and materials to research at the earliest possible moment. The general recommendation is not sufficient, however, unless it is followed by Recommendation No. 2: which advocates an approach which bases research more carefully on three principals, those of: (a) agro-ecological zones; (b) farm-centered problem-solving work; and (c) collaborative involvement of farmers, researchers, planners, trainers, and extensionists in improved

research designs and operations.

1. The agro-ecological area approach implies that research should be investigating the most appropriate farming systems for the major micro-climates identified. This would mean that the already scarce men, money and materials available should be devoted to basic, applied and adaptive research tasks in each area's most typical sites. As basic research results are first tested in applied areas, and are then further adapted for particular micro-climates, the diffusion of results from similar villages to ward to district, region, and zone should go forth. The initial research thrust will of necessity be located in only a few areas, but can be rapidly spread.

2. The research should take a farm-centered problem-solving approach. This means that more research should be done on-farm especially at the adaptive stages. The farm-centered approach attempts to define the constraints which face the farmer in his practical day-to-day farming life, and thence, to design agricultural research investigations around these problems as faced by the farmer. In this way, it is more likely that the results of the research done might be relevant to the practical problems being faced. As argued earlier in this report, much research is correct but irrelevant to those who are somehow expected to utilize and benefit from the results. It was not designed with the farmer's situation very clearly in mind. For example, some more relevant research questions whose results could be usable by farmers might be phrased something like the following: "If there are 500 person-days of adult labor and 500 shillings of cash available, what would be the best combination of sorghum, millet, cowpeas and small stock practices to invest in on a seven acre class "W" soil with "X" rainfall distributed to "Y" way, given "Z" prices and "N" cost of inputs, and so forth?

The research that would go into answering such a question would obviously be comprised of many discrete inquiries with proper scientific controls, but they would all be oriented to the actual constraints that a farmer faces in making his or her decisions about what to do. Putting together the results of these inquiries would be more likely to address the practical problems of farmers.

An example of relevant research that is insufficiently emphasized is that of agricultural engineering. Many farm management studies have demonstrated that a principal constraint on farmer productivity and production is an insufficiency of labor at peak seasons. Engineering studies to determine what kinds of affordable and manageable supplementary power or labor replacing tools, machines, and techniques would be possible are a critical priority. Yet, relatively little is done.

A similar situation exists with regard to intercropping. A very substantial majority of farmers have evolved complex intercropping systems. These diversify their risks and provide basic security of livelihood under particular micro-climates. Many researchers and extensionists oppose intercropping because it appears to be part of a "traditional" agriculture that they are trying to modernize. Unfortunately, the preponderance of evidence now available is that such intercropping is a fully rational and effective way for small farmers to cope with their physical and biological environment, within their given cash and labor constraints. It has now been found that intercropping often helps control weeds better, allows flexibility in labor use, permits nitrogen fixation, spreads risks. and so on. Despite these facts, intercropping investigations comprise a very small percentage of research program efforts.

These gaps may occur because most all development planners, researchers and other agriculturalists have never had to earn their livings directly from

small scale farming only. Their lives' experiences may be primarily as students and administrators, and their intimate, first-hand understanding of farmers' situations is lacking. The matter is not one for allocation of blame; rather it is a situation requiring correction. Part of the correction should come through comprehensive farming household system studies which correctly identify why farmers behave the way they do, and what their major technical and socio-economic constraints are. These studies have to be multi-disciplinary, integrated household studies that investigate the physical and biological environment, the technical production issues, and the human socio-economic dimensions. From such studies, the constraints identified can then be scheduled for follow-on research to discover how they can be mitigated or removed.

3. In the execution of the above, the third guiding principal for research (and in many other areas) is the collaborative approach. Close collaboration with farmers in both the design and execution of on-farm problem solving research activities is now the rare exception rather than the rule. Some farmers possess much relevant knowledge about rainfall patterns, pests, diseases, soil types, planting times, cultivation methods, intercropping, labor requirements, past experiments/results, local seed varieties and characteristics, risk minimization strategies and so forth in their own areas. As farmers are the persons who will ultimately be asked to adopt the results of experiments, the efficiency of research, the speed of results dissemination and rate of adoption would benefit by their maximum involvement. As with so many other aspects of social mobilization, participation leads to understanding and a sense of ownership and responsibility for activities, which leads to commitment and action. In addition, since useful innovations are usually built on the successful parts of an existing system, there is additional incentive for farmer

involvement.

Institute researchers, for their part, cannot ask the most relevant questions, nor design the most appropriate and efficient experiments, nor have the advisory assistance and labor inputs of farmers without spending considerable time in villages learning what there is to be learned from peasants. Without being collaboratively linked to the target clientales, researchers are likely neither to be relevant, supported, nor valued by the society they are supposed to serve.

4. Farming Systems Approaches to Research

The evidence uncovered in this study points to a number of logically deducible recommendations. Recommendation No. 3: would be that the increased resources recommended earlier be spread amongst the following types of research efforts.

a. Basic Descriptive Research Stage

(i) Enlarged institute-based research on technical issues that can only be done close to laboratories and under highly controlled conditions.

(ii) Enlarged farming systems research which describes the interplay between technical and socio-economic aspects of existing farmer behavior, in order to identify the major constraints and possible intervention points. This research would typically look at production, consumption, marketing, off-farm employment, and sociological factors in rural household systems in a variety of typical agro-ecological zones, as well as agronomic factors.

b. Applied Design and Experiment Stage

(i) The results of basic descriptive research would be utilized to formulate more precisely targeted and relevant applied

research to find ways of lifting existing constraints. Hypotheses about new technological packages within the known technical and socio-economic parameters can be designed and experimented with at institutes and at field stations, under varying conditions. It is naturally essential that many of these be examined closely at first under scientific controls, before going to the on-farm stage.

c. Adaptive Testing Stage

(i) Expanded adaptive research testing on farms, in collaboration with village government and farmers. These would be farmer-managed practical experiments that test a small number of promising technologies that evolved from the applied design stage. Conditions as close to normal farming operations would be striven for, to ascertain potential suitability and replicability in other similar environments. In this stage, extensive involvement of extension personnel in action-research could open lines of communication among farmers and extension agents, and encourage the emergence of members of villages to serve as paraprofessional agriculturalists in their communities.

d. Dissemination and Feedback Stage

(i) At this stage, the technologies which were found during the applied design and adaptive testing stages to best overcome the constraints delineated in the basic descriptive stage, are extended more widely to other farmers. This stage, of course, should also be seen as the begin-

ning of the next cycle of farmer feedback and input into the research process, especially continued on-farm adaptive testing.

5. Implementation of Farming Systems Approaches

The implementation of a research program guided by the principals noted will require priority allocation of funds, manpower and logistical support, as well as coordination linkages. Cooperation amongst research, regional and district extension, ministry headquarters, parastatals, MATIs, and the University will be required at different times and stages. There is no way of predicting the exact shape of the suggested effort. It must and should evolve from discussions. In what follows, some suggestions about crucial elements in the program are made.

a. While research institutes and ministry headquarters sectoral planners should attempt to stimulate and follow farming systems research approaches, the major actors and supporters should be the regions and districts who most need the results. Without the genuine understanding and commitment of regional/district planners and agriculturalists about the relevance of the activity, and their demand for it, a proper program would be difficult. The regions and districts will have to commit staff, funds and time in a few more concentrated areas, to work with research institute personnel. Operationally, because of the nature of the work, a unified "project team" effort would have to be forged across organizational lines. This is almost always a difficult matter, but is often a prerequisite to success. As major consumers of the research results, regions and districts should initiate discussions with the relevant institutes to map out what kind of a program design would be applicable.

b. Any program should begin from a small concentrated base until experience is gained, and skilled staff are developed. Basing early work

on the existing data base accumulated in past and current projects (such as that of the World Bank funded efforts and others) would mean that the more lengthy descriptive stage could be shortened somewhat for a few areas; and that the applied and adaptive stages could be reached sooner.

Adaptive testing could be reached sooner by building on the backlog of existing applied results, and moving to an on-farm adaptive testing stage. The crucial ingredient in this would be to fully adopt the collaborative philosophy and operating mode for work with farmers. There is some significant danger of proceeding without a fuller knowledge of constraints that would come from more thorough descriptive stage work. However, if adaptive testing is done in close consultation with farmers, it would be possible to avoid many (but probably not all) of the pitfalls.

d. Adaptive testing in conjunction with villages and farmers is an important stage from a socio-political perspective. With farmer involvement, it is more of a development action project and should be perceived less as a long term "research" only project -- one that will result only in more reports and statistics. "More research" is not a very satisfying answer to complex and emotional problems of poverty. It is often not seen as acceptable because the chances of practical payoffs seem to be problematical and far off. However, in the current agricultural sector situation, it is the professionally correct and responsible position to take. Part of the challenge is to demonstrate that farming systems research is in fact very much a practical action program; and that it is more likely to yield results than many other so-called action programs, many of which have yielded only disappointment and disillusionment. Given the now substantial history of declining output, there is empirical evidence that what has been tried has not often worked well. The broad goals and methods are not in question. The nature and tactics of some

programs are. Greater attention to the fundamentals of scientific agriculture taking the human socio-economic element of farmers into consideration, appears to be a most important step.

e. The need for additional extensionists and socio-economists to act as research liaison and coordination personnel at both institutes and in regions and districts is well known and reasonably well accepted. Research institutes will need many other staff as well, especially at diploma and B.Sc. levels to carry out expanded programs at field stations; and their priority claim on staff has been recommended elsewhere in this study. In the early years, senior visiting consultants will probably be essential until Tanzanian staff have been trained. A major pool from which Tanzanian staff could be drawn are those M.Sc. students doing their theses. They would be the group who would be most highly motivated field workers in farming systems approaches.

f. There is no way to guarantee close team work relationships amongst the physical, biological and socio-economic staff, except to stress its desirability. Multidisciplinary cooperation and mutual understanding of the contributions of each perspective by all are essential and rewarding.

g. Another aspect of the personnel area may be equally important. Far more time must be spent in villages talking informally with farmers, establishing relationships that can lead to scientific understanding of farming realities. There are now emerging some useful comparative experiences to consider. In Guatemala, short trips to rural villages by agronomosts, soil scientists, pest and disease experts, anthropologists, and economists have been utilized to stimulate multidisciplinary team work, dialogue with farmers, and integrated research designs that are based on empirical farmer needs. Interchange about practical field problems frequently leads to mutual understanding, whereas academic seminar discussions

can oftentimes emphasize the interdisciplinary gaps in appreciation. When talking with farmers about their problems, many of the theoretical differences fade away; and integrated farming systems research becomes a common sense approach.

In China, researchers live and work with farmers in rural communities to learn the existing wisdom (and myths) of farmers, to involve them in research design, implementation, and evaluation; and, thus, to establish a basis for more self-reliant testing on farms.

Whatever manner of close consultion is evolved in the Tanzanian context, it must naturally be founded on the mutual respect of individual farmers, researchers, extensionists and planners for what each can contribute to the resolution of genuinely complex but common problems. While this is easier written than done, it is not the less important for that.

h. The most practical and easily implementable approach in the initial years of farming systems research is for researchers to work extensively in villages reasonably close to the institutes. With careful design work, a representative cross-cut of major agro-ecological zones can be drawn up that will focus on those areas with the greatest problems in improving different types of crops and livestock enterprises.

D. Planning/Programming

For regional and district levels, there are two areas of agricultural sector decision-making which come up annually. There is first of all the decision on what programs to pursue in the coming year(s). This decision on setting broad strategic goals, general methods of achieving them, and the approximate allocation of resources can be called the "planning" phase. The second set of decisions concerns the detailed scheduling of how men, money and materials are to be combined to perform the required services which will actually achieve the objectives set. This is the programming

phase. Neither of these processes is especially well done in most organizations, and there is always room for improvement in even the better ones.

There appears to be a need to strengthen district and regional level agricultural planning and programming. Respondents in the survey did not indicate that a comprehensive or fully professional annual cycle or calendar of agricultural planning efforts took place routinely. While junior staff advised on village planning, and supervisors contributed to district and regional plan compilations, the process appeared to lack strong analytic content.

Amongst the shortcomings noted at district and regional levels were:

Planning Phase

- A lack of data collection, assemblage, evaluation of experience relevant to the areas serviced.

- Unavailability of adequately experienced analysts at the times and places required.

- No collaborative participation by research institutes, parastatals, and ministry personnel in their specialty areas in the exercise.

- Selection of future efforts and quota setting based on little evidence of potential viability.

- Insufficient differentiation and targeting of varying agro-ecological sub-areas.

Programming

- Insufficient use of simple activity scheduling devices (such as bar charts).

- Workload estimating, staff needs assessment, and revision of efforts to fit actual staff availability levels rarely done.

- Budget estimates preparation, cash flow scheduling, and revisions of plan to fit actual allocations are not usual.

- Logistical needs and lead time estimates for ordering and scheduling of inputs and transport services are often imprecise.

- Joint collaborative programming with parastatals and other input suppliers, supplementary training assistance sources, and other relevant organizations is rare.

- Clear responsibilities assignment and critical target date setting are not usually practiced.

- Supervisory work planning and control systems for establishing, supporting and monitoring service delivery is lacking.

All organizations have these problems to a greater or lesser extent. Most often, the shortcomings are due to the widespread unavailability of appropriately trained staff. Persons with sufficient experience to anticipate the types of things that typically go wrong in a development project and make provision in advance for such events, are even rarer. Nonetheless, the processes of rational planning and programming need to be developed; and the mobilization of persons with relevant information to contribute to the annual exercise is the first step. Recommendation No. 4: is to continue and to increase the amount of functional management planning training of supervisory officers who are responsible for district and regional agricultural programs.

Recommendation No. 5: urges that agricultural sector planning and programming be regularized into an annual routine of collaborative efforts.

a. The first task would be the working out of an Agricultural Planning and Implementation Calendar (APIC) based on the crop and livestock cycles in each district; and the deadlines for contributions to regional and national plans and budgets. Working back from the deadlines, enough time should be allowed for the timely performance of certain normal problem solving activities such as: data assemblage of previous year's results;

assessment of what works and what doesn't; feed-in of latest research findings and recommendations; consideration of national guidelines and likely budget ceilings; analysis of priority needs and opportunities; evaluation of alternative investments; application of selection criteria; and project selection. The programming activities of scheduling, workloading, staffing, costing, and supplying the projects should naturally follow.

Such a calendar could be developed by consultants to a few regions and districts where institutional capacity is advanced; and could then be spread to others. The basic idea is no different from the normal annual estimates cycle, but is applied specifically to the agricultural sector.

b. The second task required to operate the APIC is to identify which individuals and organizations have the particular expertise to contribute to the planning and programming operations. The coordinating district or regional functional manager will need to organize a collaborative effort among those who will constitute the professional advisory group to the sector. Persons will have to be coopted from amongst those who have the technical, economic and programming expertise to contribute to an area's planning effort. Depending on the nature of the enterprises, the professional advisory group might consist of some local agriculturalists, a ministry specialist, a few research institute personnel, a university researcher, a local MATI tutor, and parastatal input suppliers. What is important is that the relevant persons are assembled to make their advice known, so that the best minds are tapped. It is the responsibility of the functional manager to arrange this well in advance; and it is the responsibility of the supporting organizations to schedule the contributions of their staff to such planning/programming exercises. Much of mutual benefit can occur from such joint exercises, including better coordinated adaptive research, properly scheduled input requests, advance

notice of training needs, and realistically timed activities.

E. Training

The following chapter on agricultural education examines the full variety of program and management issues to do with training. From the utilization standpoint, however, there are two matters which deserve further comment. These are the training factors which most directly affect the efficiency and effectiveness of extension agents in the field. The first is the matter of specialization, and the second is the on-the-job (OJT) and short course training subject area.

1. Generalist or Specialist Training

The literature on agricultural extension delivery systems was consulted to determine if there appears to be any correlation between generalist or specialist training and successful impact. The consensus seems to be that specialized training is overwhelmingly to be preferred. Extension is naturally a very difficult area in which to sort out the multiple cause of success. Nonetheless, the ability of agents to be effective appeared to be based more on the thoroughness of their specialized training of all types (pre-, in-service, OJT and short course) to do a particular job, than upon general background.

The reasons for this in the Tanzanian context are:

a. Specialist agents who are fully confident of their own personal knowledge and skills in communication and practical demonstration of an innovation are more credible to farmers.

b. Generalist agents are usually the younger, more recent institute leavers. They often come without extensive farming backgrounds, or years of extension experience. In addition, because of the years of broad and general agricultural curriculums received, there was usually only time for classroom theory to be covered. Practicals are especially ill taught, and there is

little time to develop adequate "hands-on" confidence and skills. Credibility is, therefore, low with farmers who are easily able to perceive this.

c. Too much attention has been payed to formal training. Not enough attention has been given to practicals, on-the-job, and short course training. The latter training capacitates agents to handle a limited set of crop or livestock messages and techniques for a specific set of farmer clients at a particular place and time. It is this training which has contributed to impact when successful programs have been mounted elsewhere.

d. The tendency to argue for generalist training often comes from the uninformed hopes of higher administrators that they can find a budgetarily feasible, lower cost, quick-fix solution to staffing problems. Such policies are not based on an understanding of the nature of the professional tasks faced in the field.

e. The generalist approach has occassionally been justified by reference to the American example of generalist county agents. This argument by analogy misses the situational factors in the United States. In the U.S. context, the generalist agents are information brokers that receive feedback from farmers on problems and arrange for university or government specialists with relevant information to communicate directly with the farmer. In addition, most extension is now done by specialist private sector input supply firms which are highly motivated. They work with literate farmers who possess generally positive cultural assumptions about research results and publications. The argument by analogy for generalists in developing countries cannot be upheld.

f. Adherents of the generalist training approach also fail to appreciate the amount of time it takes for a relatively youthful person to adjust to the extension job. There are unrealistic expectations about what one Bwana/Bibi Shamba for each village could do. Underestimated is

the importance of working under older, more experienced agents for a number of years to learn about a particular area, the local agricultural problems, past efforts, the peoples' practices and so forth.

g. There is an apparent failure to recognize some sociological aspects of the certificate level generalists. Many come from non-farming backgrounds, are not necessarily interested in agriculture, and are also from amongst the weaker, non-math/science students. They are taught by large numbers of equally inexperienced tutors who do not wish to be trainers in large part. These are not auspicious indicators for successful work.

h. There also appears to be an educationally unrealistic expectation as to how much agricultural information can be covered and remembered by Form IV participants in a two-year course, the application and reinforcement of which is delayed until another year of national service is completed. When general agriculture and animal health curriculums are combined, to be taught in the same amount of time formerly utilized by only one of them, it should also come as no surprise that the products are weaker in both subject areas.

i. Greater professionalization of staff tends to begin at the diploma level. Most survey respondents in the field indicated that experience plus specialized diploma level training results in far more useful staff.

j. Lastly, as the organization structure of the administration results in the assignment of generalist certificate staff to either crops or livestock officers in the districts, the generalist training rarely gets utilized. In addition, the burden for supplementary on-the-job training becomes all the heavier on already busy officers.

The very strong Recommendation No. 6: which follows from this is that training's contribution to manpower efficiency and effectiveness will be heightened by a specialist orientation at all levels. At the

certificate level, a solid foundation for future learning can be established in certain broad crops and livestock specialities; and these can be developed further through additional training of various types at later times.

2. OJT/Short Course Training

It is especially unfortunate that the generalist vs. specialist issue should so becloud the discussion of training's role and real contributions to agricultural progress. For as in most career fields, the bulk of real learning occurs on-the-job through accumulated experience and coaching by older colleagues and supervisors. This central fact has been largely ignored by many agricultural administrators in many countries who have (mis) placed their trust in the formal system. Both systems are obviously needed, and each is of equal importance in their contributions to the goals of development. What has not been grasped is that on-the-job (OJT) and short course training possess innumberable advantages over formal training courses for successful action under field conditions.

OJT and short courses are far less expensive to arrange and operate. They are as simple as a supervisor's one-to-one explanation of a point in the field, as informal as a 2 hour training session after a monthly staff meeting, or as structured as a 3 day course at a MATI or at the headquarters. Such training is more focused on the practical problems faced in current work, comes in digestible small units, is more targeted to the precise individuals who need to have their skills upgraded, is learned more thoroughly as the trainees need the information and are better motivated to receive it, and it can be taught on a part time basis by existing staff as part of their normal jobs. Thus, OJT and short course training are relatively lower in cost, and higher in effectiveness than most other forms of training.

Training of this nature is presently insufficiently funded and utilized by supervisors and agricultural managers throughout the sector.

This is very regrettable. When viable recommendations do exist, the training part of the "training and visit system" evolved by Benor and Harrison is often an essential ingredient for extension success. Concentrated courses on subjects designed to help agents be and appear confident, skilled and effective in undertaking a concentrated campaign are therefore amongst the highest priority needs on any training agenda.

For all of these reasons, Recommendation No. 7: is that:

a. More funds be provided for transport and maintenance and operating purposes for OJT and short courses in district, regional, and ministry estimates.

b. Supervisors be instructed and reminded of the important part that training plays in their portfolio of responsibilities.

c. Training methods be taught to supervisors by qualified Ministry and MATI staff from time to time.

d. MATIS, FTC, UDSM, research institutes, parastatal and other personnel should willingly make themselves available to teach in and contribute to such courses.

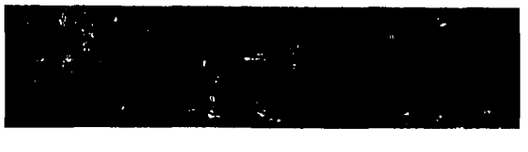
e. Supervisors should be held accountable for implementing OJT and short courses to strengthen the extension effort.

(See also related recommendations, VII-1, IX-23, IX-24, and IX-25.)

It is reassuring to note in passing that in the utilization survey, 160 out of 177 respondents indicated that they could conduct such training with some additional financial support on recurrent account. In addition, 125 out of 177 respondents indicated they now use staff meetings occassionally for training purposes.

F. Extension Operations

As the exposition of supply and demand in Chapters III, IV, and V demonstrated, the manpower gap at certificate and diploma levels will



continue for many years to come. The shortages of funds and logistics are also well known. The major question therefore is how each organization can maximize their extension impact with admittedly scarce resources. This section suggests some guidelines which would permit extension administrators to work within the realities of their constraints, but allow a better chance of effective action.

The famous quote from President Nyerere's speech (Daily News, 21/10/74) in which he doubted that the sacking of all agricultural officers would affect production, is frequently cited in criticism of the extension services. This is unfortunate because there are many reasons in different parts of the country why balanced cash, food, and livestock production and productivity have not increased markedly. This chapter has so far mentioned the central fundamental problem of missing viable recommendations, the need for expanded and improved types of research, the planning/programming processes that require improvement, and the training operations gaps. Subsequent sections will deal with organizational structures and coordination, finance, logistics, and personnel administration. All have contributed to the declining performance of the agricultural sector. The nature of extension operations bears its share of responsibility, and is examined below.

1. Deployment of Staff

It is clear from the comparative experience of many developing countries that extension success occurs when technically viable recommendations are combined with adequate price incentives, timely inputs, credit, marketing arrangements, and properly supported extension. Together, these factors can constitute a critical mass to alter farmer practices. The efficacy of extension is determined in good part by the degree of geographical concentration of staff in certain micro-climates as reflected

in farmers per agent ratios.

The current practice in many areas is to scatter agents across districts, with most of them being made responsible for more than one village, without adequate technical and administrative supervision and support. This diffuses effort over an area wider than can be handled, and does not allow the frequency of high quality interactions with enough farmers to be effective. Follow-up, an essential ingredient of extension, is rare.

As the blanket recommendations for many (if not most) areas and enterprises have not been locally validated, this means that most of the efforts made do not yield results. To claim that this mode of operation represents a more "equitable" distribution of government services is clearly fallacious and untenable. To continue with it is wasteful of the limited men, money and materials available.

Concentration of efforts area by area in extension operations is no different than the building and staffing of schools and clinics in particular places, according to certain criteria. The essential fact is that these facilities cannot be built everywhere at the same time due to a shortage of resources. Similarly, extension needs to concentrate more of its efforts in two places: in those areas where success is more likely due to the state of viable recommendations; and in those areas where extensionists are needed to help develop viable recommendations through adaptive testing with farmers. With concentration on these two efforts, in a selected cross cut of agro-ecological zones, the probabilities of being able to help all farmers sooner is increased immeasurably. Recommendation No. 8: therefore urges that concentration of efforts be employed in extension; and that educational efforts to explain the reasons for this approach be made. It is the responsibility of each district and region

to professionally tailor its efforts to a few areas, so that unnecessary wastage of the peoples' tax money does not occur.

2. Active Campaign Approach

In some areas there is the tendency for a "reactive" style of extension to prevail. This is similar to the "curative" doctor style of health delivery systems in which the doctor waits to be consulted by a patient. The contrast is a more active and aggressive stance, whereby concentrated campaigns are mounted that focus on particular innovation packages that have been proven viable. In combination with a deployment strategy of areal concentration, such an approach appears to have great efficacy in many countries.

3. Extension Through Action Research

As noted in much of the above, effective extension is closely linked with cyclical research efforts in which farmers are intimately involved. Recommendation No. 9: The separation of research from extension in daily work in the field is a poor practice which should not be permitted to continue. Senior managers in districts, regions, ministries, research institutes and parastatals should be held accountable for facilitating cooperation and coordination. Frequent joint efforts in action research at descriptive, applied design, and adaptive testing levels that are attuned to the needs of small farmers are required. District extension administrators should willingly second staff to work under the direction of research institute staff, where properly programmed as part of a districts annual sector plan. Without this support extension will continue to lack viable packages, staff will grow in frustration at their inability to contribute, and farmers will continue to be cynical at the relevance of Government administration.

4. Role Conflicts of Extension Agents

The well known example of role conflicts in rural work is the case of the community development agent who is also the tax collector. Most observors would agree that the roles are incompatible. Nonetheless, agricultural extension agents are still often asked to play major roles that do not fit well together; and may often negate the good that could be done. When a person whose principal function is to receive, transmit, and exchange information with farmers, is also called upon to evaluate their credit worthiness, or organize the allocation of inputs and other similar operations, he/she loses a great deal of effectiveness. Recommendation No. 10: Role conflicts should be minimized wherever possible by correct divisions of labor amongst the concerned rural development organizations. To do otherwise is self-defeating.

5. Utilization of Sub-Technical Cadres

There are approximately 3,996 field auxillary and attendent staff in the sub-technical cadre. At present, policy is to promote those who are able to enter and complete certificate training, and to allow normal retirement to take place for the remaining numbers. New hires for this cadre are not supposed to occur. This will take quite a few years to effect. In the meantime, many persons from this cadre could be better utilized in campaigns which concentrate on the communication of selected improved practices. When proper OJT and short training is given to a number of these personnel, they are normally able to contribute limited but very important services. They allow a larger number of farmers to be contacted than would otherwise be possible. Supplementary training as part of a specific campaign would make for more efficient manpower utilization of this large group of personnel. Given the resource shortages, maximum use should be made of every individual.

6. Paraprofessional Extension Agents from the Village

Self-reliant agricultural development will eventually mean that rural communities should select some of their own citizens to serve as contact agents. There are a number of relatively successful examples of this being done in Senegal's animation rurale, Bangladesh's Comilla, and China's bridgades and production teams. The latter system pairs up small groups of secondary school graduates with older experienced farmers.

The general theme in paraprofessional programs is that villages will often choose someone whose opinions they respect in farming, someone who will feel a special sense of obligation to his/her home, and who is representative of the community. Such persons would receive periodic training and support in building their technical insights, and testing the alternative interventions under actual production conditions. Participation from other villagers is usually maintained by requiring each paraprofessional to relay what he/she has learned, to hear questions, and receive suggestions to be passed to researchers and extensionists.

Some of the benefits of such approaches include lower extension service costs, the equitable distribution of information, the formation of a direct 2-way channel to and from research institutes, and an organizational mechanism for the conduct of adaptive testing trials.

Based on these experiences Recommendation No. 11: urges that the utilization of paraprofessionals be thoroughly explored as one possible mechanism for forging participatory linkages among research, extension, training and village communities. At the moment, it appears the most suitable approach for closing the manpower gaps that will otherwise last for decades. It also gives promise of getting more experienced farmers (rather than secondary school leavers) into the extension business. Obviously, these are not new ideas in Tanzania. The situation is merely more urgent now.

7. Supervisory Work Planning and Control in Extension

For DADOs and DLDOs, and their field supervisory staffs, there are great problems in proper supervision of individual contact agents. One observor calls rural extension services the "invisible" services, because many individuals scattered over large rural areas cannot easily be held accountable for their performance.

Ideally, extension agents should sit with their supervisors at weekly and monthly sessions to plan out what information is to be communicated to which target groups, where, when, and by what methods. Dates would be set for each agent, and the supervisor would make surprise inspections of agents during (say) a group session. The quality of performance would be evaluated, suggestions for improvements be made, supplementary training and materials be distributed, and the subsequent work program be scheduled. There are a number of work planning and control systems possible in different situations. The most well known is the "training and visit" system made famous by Benor and Harrison. In East Africa, Chambers and others in the Special Rural Developemnt Program in Kenya also evolved some useful methods.

There are a number of agricultural extension administrators interviewed in the study who were aware of this need for a system, and who had themselves received some instruction in the matter. The problems which interferred with proper implementation had to do with financial and logistical limitations most often. These are dealt with in subsequent sections.

The point to be made here is that such systems should form an integral part of campaigns that concentrate staff, finances and logistical resources on limited target areas. Within such an action framework, they provide the essential supervisory level control mechanism for administering extension work.

8. Organizational Structures and Coordination

1. Introduction

The problems of securing cooperation and coordination amongst many political, public, and parastatal organizations at national, regional, district, and village levels is a well known issue for all govenments. Integrated agricultural and rural development action requires carefully scheduled teamwork across organizational boundaries, clear understanding of the roles and authority of each unit, and timely unhindered flows of information, materials and supplies.

This managerial ideal is supposed to be achieved in the midst of communications and transport inadequacies, wars, oil price rises, staff shortages, red tape, dispersed populations, droughts, budget cuts, and human foibles. Unfortunately, the effort requires those precise resources that lower income countries most often lack, in the midst of crises that only higher income nations could easily bear.

It is a testament to the strength of the nation, its institutions and its people, that so much is achieved, rather than the contrary. This is mentioned because there is often a tendency to dwell only on the problems without a more balanced perspective. This section necessarily deals with those problems, and neglects the very considerable strengths which make the required improvements possible.

2. Coordination Problems

Questions in the survey were asked about administrative coordination problems within, between, and amongst organizations and levels. Some respondents were not comfortable with the recording of their opinions on questionnaires which identified the source, despite assurances that these would be tabulated separately from the manpower demand and supply figures. Therefore, a number of responses where taken separately "off-the-record". These did not in fact differ in any significant way from those respondents

who were perfectly comfortable filling in the forms.

A content analysis of the recorded responses was made from 179 supervisory managers. Fifty-four (54) percent of the problems concerned organizational structures and functions; thirty-five (35) percent were about logistics, seven and one-half (7½) percent revolved around personnel matters, and the remaining were miscellaneous. Of the 243 individual responses on organizational coordination, the areas which received most frequent mention were as follows.

Exhibit VIII-C

Focus of Administrative Coordination Problems:
Frequency of Mention by Supervisory Managers
in the Public Sector

Relations Between	
Regions and Districts	80
MOA and Regions/Districts	63
Parastatals and Regions /Districts	50
PMO and MOA	30
PMO and Regions/Districts	20
	243 Responses

Source: End User Questionaire, Question No. 45. See Appendix A-VIII.

For regional and district coordination, and MOA and regions/districts relations, there is a cluster of common, interrelated concerns. These are:

a. The chain of command is overlong, causing serious delays which affect the technical support of district by region, and of both by the MOA headquarters. In a goodly number of regions and districts (but not all), respondents reported that RDDs and/or DDDs have forbidden direct communications between functional managers and their technical counterparts at regional, district or ministerial levels.

b. The routing of communications to and from district and regional levels often has to be through the DDD, or RDD, to the Ministry or each other.

Because of the volume of communications which pass through RDD and DDD offices, there are often long delays for agricultural sector messages.

c. This information overload problem not only causes delays, but may also distort the essential technical message as it passes its way through various offices. There have been cases where emergency technical messages were held up and farmers suffered losses (in one case, from bird damage).

d. There is a good deal of role confusion being encountered to complicate matters further. This appears to occur because the policy/administrative reporting line is different from the technical information communication and coordination lines. It is often difficult to divide the content of agricultural issues into their policy/administrative content and their purely technical aspects. Therefore, there is always uncertainty on proper procedures and fear of doing things incorrectly. Therefore, the prudent administrator will tend to choose the slower but safer administrative path, even if this causes technical bottlenecks.

Taken together, these authority structures, communications procedures, overload and role problems inhibit both improved administrative as well as technical action. They make it difficult to communicate, discourage the attempt to communicate, and cut down on the exchange of information. They were not intent of the decentralization effort, nor did they form a part of the McKinsey Report's recommendations and definitions of roles and functions. It is therefore important to trace the origins of these organizational problems.

3. Origins of Organizational Dilemmas

Many difficulties began with the introduction of the decentralization schema. The decentralized "prefectural" model introduced has the advantage of structuring potential for horizontally integrated activities across all functional fields at each level, as coordinated by the DDD

or RDD. It is a useful corrective for the anglophone "unintegrated field administration" model, which structures in strong, vertical, top-down control of each functional organization. (See Exhibit VIII-D).

In the early colonial days when the complexities and tasks of governance were fewer and a small number of foreigners could coordinate efforts informally across departmental lines, conflict could be kept within bounds, and cooperation was relatively easier.

However, with the advent of development projects requiring democratic participation, integrated planning and extensive organizational coordination, the unintegrated vertical model was discovered to possess major shortcomings. The changeover to decentralization provided unity of command at lower levels across functional lines, closer to where development action was to occur.

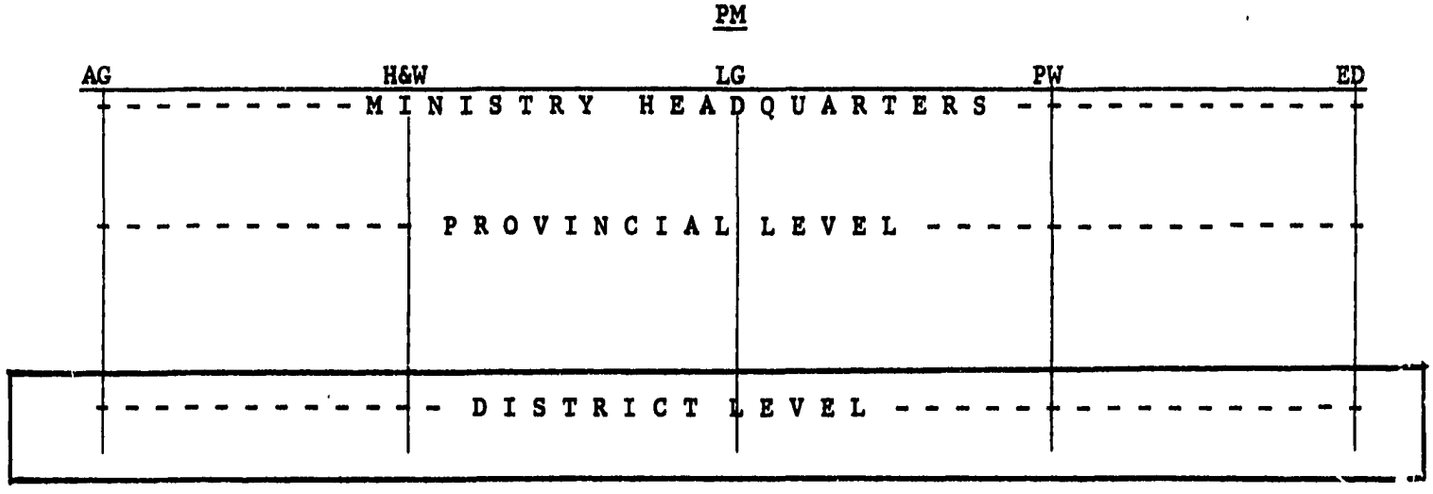
No organizational structure is free from shortcomings. Structural arrangements usually represent a trade-off among advantages and disadvantages. The decentralized prefectural model usually runs into difficulties because district and regional practitioners still need the support of regional and central government levels for certain things. This support involves finance, logstics and personnel administration, much of which must necessarily be coordinated from a national perspective. It also requires the technical assistance which can for the moment only be provided by national research, planning, and training institutions. None of these important organizational system inputs are fully controlled by the districts or regions.

This situation has occassioned some of the running-in difficulties in changing to a more decentralized system. Many problems identified in this survey are symptomatic of continuing and insufficiently resolved issues. Personnel are adjusting to their DDD and RDD administrative

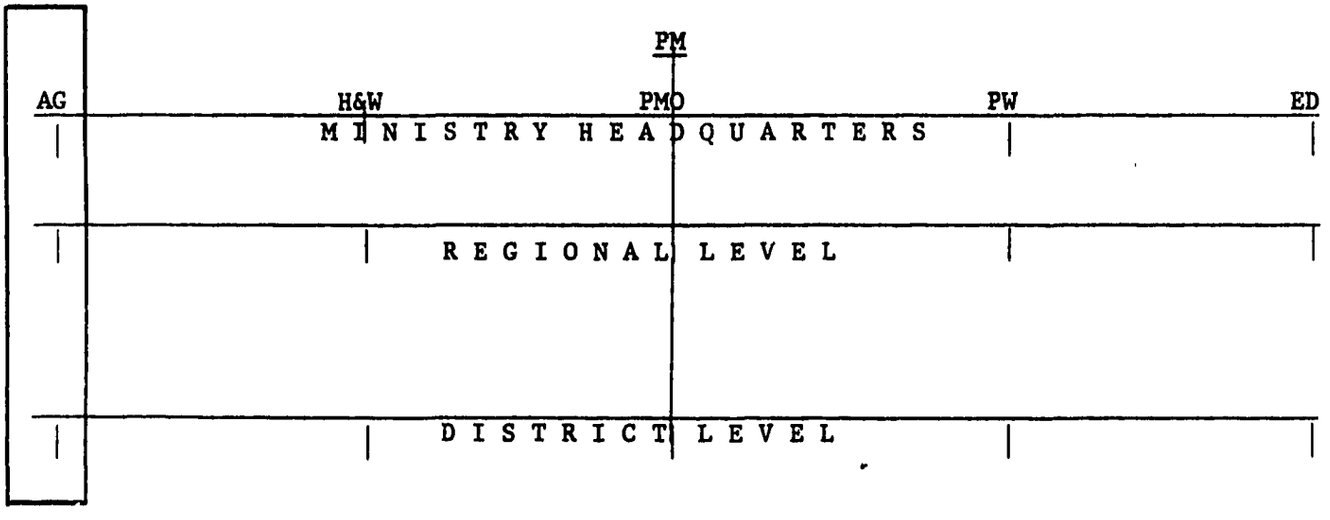
Exhibit VIII-D

Contrast of Organizational Structures

1. Unintegrated Field Administration Model



2. Decentralized Integrated Prefectural Model



Lines of Authority _____ Lines of Coordination - - - - - - - - - - -

Principal Problem Areas for Coordination

authorities, but still need the technical assistance and advice of senior agriculturalists from institutes and ministries who used to be their superior officers; and with whom they share common professional identity. When they don't receive this they feel deserted and inadequately supported. New DDDs and RDDs were faced with asserting their authority over a large array of former ministry-controlled personnel, and this is a considerable span of control to exercise. The norms and habit patterns of the past have needed to be changed, and new policies and procedures have had to be worked out. Ministries have had to adjust to a more limited sphere of activities, loss of authority, sensitivity to incursion by region and districts, and the working out of accomodations to the changed structure of government. That there should be difficulties in clarity of roles and authority from time to time is not surprising. That it should strongly affect the efficiency and effectiveness with which personnel can work, has been one of the more unfortunate side effects. While distressing, the problems are in fact being continuously worked out. In the remainder of this section, an attempt is made to suggest guidelines that might be useful in continuing a process that is already well advanced.

4. Authority Structures and Roles

Professional officers in the survey did not feel there was anything "wrong" with the current structure and chain of command. It is believed to have the potential to be responsive to the party and people, depending upon the attitudes and behaviors of the people who operate it. If the Ministry of Agriculture (MOA) is fearful of raising the ire of regions and districts and being seen as "interfering", then it will tend not to communicate and support the field efforts sufficiently. It will then tend to concentrate on its other areas of major responsibility. Similarly, if regional/district professionals feel inhibited from seeking technical support, information and advice, then there will be a shortage of

requisite knowledge, skills and advice for improved decentralized decision making. Thus, all respondents strongly supported the decentralized structure, and wished only to improve its effectiveness. The earlier section on planning/programming processes which recommended the establishment of professional advisory groups was attempting to respond to this problem.

a. Decision Making Authority, and Advisory and Implementation Roles

The major differentiation between the regional/district administrative authorities (Regional Commissioners and RDDs, Area Commissioners and DDDs) and the professional agriculturalists at all levels is the question of decision making authority. There is no question but that the former have such authorities as part of the political/administrative direction of the nation. Functional managers and MOA professionals are sectoral specialists with two major roles:

(i) Policy and Program Advisors. They are to gather, and analyze information, to be able to advise decision makers at each organizational level.

(ii) Program and Project Implementers. They are to put into effect the decisions taken.

As long as professional agriculturalists working with a region/district know that their role is to perform supportive advisory and implementory functions, there should be less cause for concern. Basic strategies, general policies, and investment decisions are naturally set by the regional and district leaderships within the national guidelines.

b. Operating Difficulties

In the division of functions (between decision making and advisory/implementation roles), any operating procedure which inhibits

communications among professionals directly injures the ability of decision makers to secure the best advice and assistance in a technical field.

Recommendation No. 12: Clarification of the roles and normal operating modes of the professionals and administrators should be made in line with the following suggestion:

(i) Routing of Communications. Letters and memoranda should have the original and sufficient copies pass through the formal chain of command so as to keep administrative superiors fully informed at all times. At the same time, an "action copy" should be sent directly to the receiver so that routine business does not encounter delays.

(ii) Delegation and Management by Exception. Administrative authorities should in general practice maximum delegation of most all activities within a sector. Frequent consultation between RDDs/DDDs and their agricultural officers should establish what matters have unresolved policy/administrative implications; and which can be treated as routine. The former should be cleared in advance if there is any substantive question. Occassionally there will be time when a functional manager will not judge certain issues in the same way as his superior. In such cases, "management by exception" will need to be practiced. It may be necessary to correct a delegated decision or communication made by a subordinate manager. With proper advance consultation, such occassions will be rare. However, when they do occur they should be treated as a normal part of doing business in complicated matters, and not be considered as a clash over authority.

While all subordinate advisory and implementory activities are naturally subject to the RDDs and DDDs approval, prior approval of every matter would and does sometimes create unnecessary bottlenecks for the 90% of business which is purely routine.

This is an area of judgement in which few specific guidelines can be given. Managers who do not delegate sufficiently should naturally be held accountable for the unexpeditious manner of their administration. Normally, the results of non-delegating managers are poorer than those who do delegate fully and well.

(iii) Free Flows of Information. Functional managers and specialist staff should receive constant encouragement to stay in touch with colleagues at research institutes, training sites, field stations, MOA offices, university departments, parastatals, and others. The challenge should be to secure information and advice relevant to solving regional and district agricultural problems. Not to be actively seeking information and staying up-to-date should be accounted as a serious failing in agricultural management.

(iv) Role of Ministry of Agriculture and Research Institutes. The major roles of the MOA with special relevance to the regions and districts are: manpower development and allocation, personnel system record keeping, agricultural sector planning, technical support by subject matter specialists, and dissemination of technical information. The MOA should be actively involved in seeking to know the needs of the regions, and arranging to provide more

and better services directly to them. Travel by headquarters persons should be fairly frequent to stay in touch with agriculturalists in the field. The attitude should be non-directive professional advice by headquarters persons whose duties are to stay in touch with national and international experience, and pass it on.

The MOA helps to set agricultural policy at the national planning level and reviews the plans submitted by regions for conformance with national guidelines. It should therefore not attempt to exercise a directive authority in the course of providing supportive services. The MOA should be held accountable for the volume and quality of services provided to regions and districts.

This latter concern about supportive services is critical in the area of technical information dissemination. The utilization questionnaire found that 42% of respondents had received no communications from research institutes in the past year. Only 34% had received from one to five pieces of information. Similarly, 152 out of 173 respondents indicated that they had not received enough technical information for extension purposes during the year. In addition, 130 out of 169 respondents reported that research findings are not available in forms appropriate for technical level personnel to communicate effectively with farmers. It was also found that 150 out of 171 supervisors did not have any copy of the last four issues of the East African Agricultural and Forestry Journal; and 109 out of 174 did not have a single copy of the last four

issues of Ukulima wa Kisasa. These are all very adverse indicators of a situation requiring correction.

c. Parastatals and Regions/Districts. Both sets of organizations do not feel in adequate contact with one another. The regional and district functional managers are given the responsibility for advancing agricultural development in their areas, but they do not have the formal authority to command professional cooperation from their counterparts in the parastatal sector. They would especially appreciate three things:

(i) Regular consultation about
- the plans and programs and projects of parastatals, in order to know their extent and potential impact
- the advice and guidance which parastatal personnel can contribute to district and regional planning;

(ii) Occassional cooperation when work programs can scheduled to avoid any conflicts of competing activities in areas;

(iii) Information on the level of impact of parastatal efforts, which would greatly assist officers to fulfill their agricultural statistics report assignments.

Two suggestions are made in this regard. Recommendation No. 13: is, first, that district and regional parastatal managers should be made coopted members of management teams, with special responsibility to contribute to agricultural sector planning and programming; and that

Second, a general policy directive should be issued by government encouraging the very closest professional communication and cooperation among parastatals and regions and districts, as part of the national effort at integrated rural development.

d. Frequency of Organizational Meetings and Effects on Work Program Implementation. Another aspect of administrative coordination which appears to require improved scheduling concerns the holding of political

and administrative meetings. Functional managers and others indicated that they would very much appreciate advance notice of meetings whenever possible. In a number of cases they sometimes find themselves having to cancel important field trips at the last moment. Oftentimes the cancellation resulted in inadequate supervision being given field staff, the disappointment of farmers, and delay in the agricultural delivery system. One manager who had kept track of his schedule indicated that 16 out of 24 working days in a month (or 66%) had been taken up with committees and other meetings. All managers fully recognized the essential nature and value and importance of many (if not all) get-togethers. With sufficient advance notice, a more realistic accomodation by meeting convenors and participants could advance their common objectives.

e. District and Village Relations. Some slight difficulties have been encountered by village level personnel who are payed by PMO. These individuals receive direction not only through the formal chain of command (district and ward agricultural staff), but also from village council, manager, and committee members. Assignments of agriculturalists to non-agricultural duties does occur, and this sometimes interferes at times with the principal work tasks. Most persons recognize their responsibility to play a helpful part in the village community of which they are a member. Thus, the resolution of the issue appears to be one of scheduling the use of a public servant's time more carefully in advance to avoid any conflict. This matter raises the general problem of village and district level agricultural planning and coordination. An important part of that process is consultative feedback to the village level on the work schedules of technical personnel in each quarter of the year. With such information about what is to be done by agriculturalists, when and how, village leadership can avoid creating dilemmas for the individual worker. They will also be better able to monitor the performance of their public servants.

f. Decentralization Outlook. Occassional mention has been made of a need to centralize extension services as part of a revitalization effort, according to some literature. The experience of most developing countries is that extension should be centrally directed, but only from the lowest possible governmental level. This has been found to foster responsiveness to the diverse needs of varying rural communities. This is usually the district level. Running-in difficulties will occur from time to time in any new system, and this occassionally makes senior administrators consider the "good old days". However, the efficiency and effectiveness of decentralized services in most large countries wishing to encourage local involvement would not support a recentralization. As the institutional capacity grows at regional and district levels, more and more functions will probably become candidates for transfer of authority downward. For example, while research institutes presently require central direction and control, researchers will only begin to be fully responsive to varying local needs of small farmers if part of their budget comes from regions and districts. Until then, organizational linkages must be built to influence research investments, and to profit from the expertise of fellow professionals.

H. Finance

There are three issues which need to be addressed under the finance function. These are the adequacy of allocations, their timeless, and the need to concentrate funds. The utilization survey highlighted that estimates for vehicles, operating costs, maintenance and repair, travelling allowances, equipment and supplies, and training were highly inadequate. These are shown in Exhibit VIII-E.

Exhibit VIII-E

Ratings of Adequacy of Recurrent and Capital Estimates by Supervisory Managers

Line Item	Adequate	Borderline	Inadequate	No Answer
a. Vehicle	5	12	156	4
b. Transport - fuel, oil, etc.	13	31	130	3
c. Vehicle maintenance and repair	7	29	136	5
d. Travelling Allowance	1	19	157	5
e. Equipment and Supplies	7	43	123	4
f. Training - short courses and Seminars	13	37	117	10
g. Telephones and Telegrams	50	52	65	10
h. Upkeep of Stations, Buildings	9	35	118	15
i. Clerical Assistance	25	43	94	15

Source: Appendix A-VIII, Utilization Survey Questionaire, No. 48.

Equally important was the response to the question for the number of months in a year in which staff are unable to carry out their duties due to shortages in funds. The response of 170 managers was an average of 5.34 months. This implies that for an unacceptably large part of each year, many staffs function at well below their capacities; and some are often completely stymied in accomplishing their work. When eliminating those 24 out of 170 respondents who claimed that their staffs were incapacitated for all 12 months, the average dropped only to 4.2 months per year. Exhibit VIII-F gives the respondents' perspectives.

Exhibit VIII-F

Utilization Question No. 50 Responses

"How many months out of a year are your staff unable to carry out their duties, due to shortage of funds for petrol, vehicles, equipment, allowances, or other items?"

(1)	(2)	(3)	(4)
No. of Months	No. of Responses	Column Percentages-Col. 2	Weighted Average Calculation-Col. 1 x 2
0	5	2.9%	0
1	3	1.7%	3
2	14	8.2%	28
3	37	21.7%	111
4	27	15.8%	108
5	15	8.8%	75
6	33	19.4%	198
7	3	1.7%	21
8	3	1.7%	24
9	6	3.5%	54
10	0	0	0
11	0	0	0
12	24	14.1%	288
	170 Respondents		910

910 ÷ 170 = Average of 5.35 Months

If responses of 24 managers claiming 12 months of "down time" are eliminated from calculation, revised totals would be 622 ÷ 146 = Average 4.2 Months.

Source: Utilization Questionnaire, Appendix A-VIII, Question No. 50.

When respondents were asked to specify the months that they suffered most particularly from shortages of funds, the frequency of responses is shown in Exhibit VIII-G. Obviously, the fourth quarter gave the greatest difficulty; but note should also be taken of July, the first quarter of the new year. This probably reflects the late arrival of quarterly allocations.

Exhibit VIII-G

Utilization Question No. 49. Responses

"In which month or months of the year do you experience significant shortages of funds for your work?"

Quarter	Month	No. of Responses
1st.	July	75
	August	51
	September	38
2nd.	October	36
	November	28
	December	47
3rd.	January	62
	February	57
	March	82
4th.	April	114
	May	128
	June	139

Source: Utilization Survey, Appendix A-VIII, Question No. 49

The frequency with which different types of financial problems occurred is shown in Exhibit VIII-H. The high incidence of responses categorized "frequently" and "very frequently" indicate the relative order of seriousness.

Exhibit VIII-H

Utilization Question No. 51 Responses

"How often is your organization's work adversely affected by the following?"

Item	Not At All	Occassionally	Frequently	Very Frequently
a. Delays in Issuing Warrants	13	83	48	28
b. Adequacy Qtrly. Allocations	17	56	56	48
c. Acctg. Reg. Cause Delays	32	65	50	25
d. Report Submissions Are Late	58	57	21	10
e. Difficulty in Obtaining Supplementary Funds	13	31	36	82
f. Travel to Clear up Confusion	79	53	15	19
g. Delays in Obtaining Imprest	64	48	36	22
h. Travel Warrent Delays	116	35	15	5
i. Efficiency of Accounting	49	68	36	19
j. Delays in Receiving Supplies	8	32	54	62

Source: Utilization Survey, Appendix A-VIII, Question No. 51.

The underlying problems reflected here appear to be twofold. First is the genuine shortage of funds. Only a larger allocation of funds to the agricultural sector can deal with this. The second is the reluctance to concentrate funds in particular efforts. Rather, there is a tendency to spread funds over many areas at the same time. This appears to result in many well intentioned ventures, all of which are inadequately supported, and therefore are unlikely to achieve their objectives. The attempt to satisfy all legitimate competing claimants for funds has tended to cause discontent by many. Administrators and professionals can only influence these matters to a certain degree. Basically they are a matter of policy direction; and need to be addressed at that level. In the meantime, the argument for concentration which has already been made elsewhere is believed to apply here as well.

I. Logistics

1. Transport

The proolems of logistics are related directly to finance in large part. Hundred thirty nine (139) out of 159 respondents specified transportation difficulties as the major issue. When viable recommendations exist and concentrated campaigns are undertaken, successful action often depends on the availability of vehicles for supervision and input supplies. Recommendation No. 14: Adequate vehicles allocations to supervisors, and motorcycles and bicycles on government loans should be provided to enable the proper supervision and extension range by field personnel. Without such logistical support, the supervisory work planning and control system will not function to support a project.

2. Joint Programming by Users and Suppliers

The other aspect of logistics which has given trouble is the matter of ordering equipment, materials and supplies to arrive on time in the locations required. The specification of what will be needed for any

particular activity, and the calculation of lead times required for placing orders, the assignment of these tasks to particular individuals, and the checking on accomplishment of tasks by certain dates is not often done well. As noted in the section on planning and programming, it is suggested that these activities be carried out in joint efforts of supplying and using organizations sitting together to understand each other's needs and making joint calculations.

J. Personnel

There are a number of conventional problems being encountered, many of which are well covered by the Tanzanian literature in the field. There are few easy solutions to them.

1. Promotions

There appears to be a major misunderstanding of the Ministry of Agriculture's role in promotions. Many field personnel feel that promotions are overdue, that they are being neglected by MOA headquarters, and that headquarters personnel receive greater attention. This is especially unfortunate because of the critical role that promotional opportunities play in affecting productivity of officers. Recommendation No. 15: is that a circular describing the promotions system in very clear language should be put out. It should emphasize the role of the recommending officers and the importance of timely submittals of evaluations from the field. Many officers are not aware that the MOA only handles the procedural paperwork for promotions, and then passes the recommendations for promotion onward through the Ministry of Manpower Development to the Civil Service Commission.

In a related aspect, many field personnel have the impression that annual evaluations are being completed by individuals who are not in a position to know their actual strengths and shortcomings in professional performance. This would be unacceptable wherever it occurs, and would undercut the sense of equitable opportunity to get ahead. An informal

inquiry into the situation should indicate the degree of seriousness.

Recommendation No. 16: The system by which accelerated promotions beyond seniority list position can be accomplished should be examined. A balance must be struck between the need to bring exceptionally talented persons into higher decision making positions, and fairness. Regulations which tend to over-restrict the chances of accelerated promotions should be examined, and then adjusted.

2. Staff Transfers

The survey revealed that RADOs, RLDOs, DADOs, and DLDOs are the most frequently transferred group of individuals. Of them,

15% have not been in office for one year

39% have not been in office for two years,

64% have not been in office for four years.

An average transfer rate of 17% per year was computed for these supervisory managers. Lower level staff had a transfer rate of only 8% per year. Managers had the impression that transfers were more frequent for lower level staff, but this proved to be completely inaccurate in fact.

In a related question, it was discovered that the professional group's recommendation of the minimum length of time a person should work in an area in order to do an effective job, is a 3.6 year average. The opinions of the officers are most likely to be sound. Recommendation No. 17: It is advisable to make 3½ to 4 years in one place a minimum term of office, as a normal operating guideline.

In passing, it should be mentioned that the increased prior consultation among MOA, regions and districts when transfers are required has been especially well appreciated by field personnel; and should naturally be further encouraged.

3. Women Agriculturalists

Studies throughout the continent are continuing to point to the

potential of women in carrying extension packages most quickly and thoroughly to those who perform the majority of farm tasks. The national committment to equal opportunity for women should naturally be continuously reflected in the selection process for agricultural training. At the moment only 12% of certificate enrollments are women. This should be increased by a conscious and concerted effort.

4. Allocations of Staff

New allocations of staff to all end users appear to be performed more on the basis of equitable distribution than on the basis of development project priorities, and considerations of returns to an investment in manpower. As the study has indicated, there is serious question whether or not more personnel assigned to general extension duties will have much impact. Research is seen as the area deserving the highest priority for some years to come. Given the general need to build up a critical mass of people in particular efforts, the actual cost of distribution according to "false equity" should be fully recognized as a retardant on the rate of development progress. It may occassionally be necessary from a social point of view, but it is often an economic wastage. Educational efforts on this dilemma may be advisable.

5. Personnel Records Keeping System

An improved system of personnel records keeping should be investigated. At present information for both planning and routine personnel work is scattered and not kept in forms that are convenient. Some thought should be given to a system of Personnel Action Notices which are to be filled in for every transfer, promotion, or other activity; and which have a standard distribution list to all who need to keep track of officers.

TANZANIA AGRICULTURAL SECTOR MANPOWER STUDY: The Demand, Supply, Education, and Utilization of Professional and Technical Agricultural Personnel 1979-1986. Chapters 9-11 & Appendices

PN-AAJ-516

Chapter IX: AGRICULTURE EDUCATION

Chapter IX: Agriculture Education

A. Introduction

In this section of the report the findings and recommendations of the educational specialists on the study team are presented. The agricultural education sub-team consisted of one full time member (from Kilimo), one three-month consultant, and one two-week specialist (for the University). For a vast scope of work, the period of assignment was quite limited due to budgetary constraints. The team members relied upon data and opinions collected during the study, as well as their own considerable experience in the Tanzanian agricultural education system.

The institutions discussed in this chapter are: The Ministry of Agriculture Training Institutes (MATIs); the Faculty of Agriculture and Veterinary Science of the University of Dar Es Salaam; foreign study institutions; agriculture-biased secondary schools; and other institutions which provide some agricultural training. The greatest attention was naturally focused on the MATI system and the University, because of their preponderance in the whole system. Inquiries and analyses were made as to both the programmatic and the management aspects of these organizations as called for in the terms of reference.

The agricultural education appendices show the tabulated responses of tutors, students, administrators and recent graduates to the questionnaires administered, and should be consulted for detailed information. In general, there was a rather remarkable consistency among respondents and study team members in their analyses of problems. Naturally, solutions varied somewhat more. The recommendations contained in this chapter should hopefully serve as a basis for further discussions amongst all concerned individuals and groups. Without doubt, further analytic work is required by other educational specialists and consultants to follow up this effort. For example, the critical issue of MATI consolidation will require highly detailed study by facilities and curriculum planners. Only in the light of the size of the expansion eventually called for and the specialty fields to be taught can appropriate institutional designs and development be properly shaped.

In discussing any educational system it is naturally important to keep an open mind as to the exact form, functions, and processes of institutions. Within the Tanzanian national philosophy and policies, there is enormous scope for designing and redesigning organizations to serve the people and fit the needs of the economy. There has already been considerable rapid growth and change in the agricultural education system, which has been in existence less than 15 years, and many parts of which have been established for less than 10 years. A major strength of the system is its committment to practicality in education, striving for increasing relevance to the real needs of the peasants it serves. At their best these institutions stress experience and practical skills; and they attempt to create healthy attitudes toward work and to ease the transition from school to work.

B. Ministry of Agriculture Training Institutes

1. Overview

The Ministry of Agriculture's Manpower Development Division currently operates twelve Agricultural Training Institutes (MATIs) with a total enrollment of 1,885 students and a staff strength of about 388 tutors. The MATIs vary in size from a capacity of 36 students at CVL Temeke to one of 346 students at Ukiriguru. Many Training Institutes have been created in the last 10 years. Several have operated for only one to three years in their present form. Generally speaking, they are characterized by inadequacies in staff, equipment, and facilities but are making steady progress in correcting these weaknesses. Their most chronic and continuing problem is that of inadequate recurrent funds. Several donor countries are helping to alleviate the problems by providing expatriate staff, new buildings, equipment and staff training.

The MATIs conduct 2-year Certificate courses for Form IV leavers, a 3-month retraining short course for previously specialized Certificate holders, and a 2-year diploma course. Since 1977, most Certificate students have followed a general agriculture course which combines crops, livestock, and veterinary science instead of following either a crops or veterinary/livestock specialization as before. The over-

whelming majority of those who graduate from the MATIs, especially at Certificate level, enter into extension service work.

After two years of field assignment, the Certificate holders are eligible to be recommended for a second entry into a MATI as Diploma students, where they specialize in one of several fields of Agriculture. This two year Diploma program is known as "in-service training" in Tanzanian agricultural education parlance. (Other shorter term in-service courses are known as "short courses" or"seminars" or carry some other designation.) Many Certificate personnel do not enter Diploma coursework until they have been working in the field for 5 to 10 years. More than half of the Diploma graduates serve as specialists working at district or regional agricultural offices while others go to veterinary laboratories, state farms, research stations, parastatals, and elsewhere. After 2 years of post-diploma field work, they are eligible to be recommended for university coursework under the mature entry program.

The agricultural education team visited 8 of the 12 MATIs to survey and analyze both teaching programs and institutional management. They interviewed institute managers, administered questionnaires to 167 tutors and 967 students, held discussions with staff and students where possible, and toured the school facilities and enterprises. Unstructured interviews with headquarters staff were held, and circulation of early drafts of this report provided additional opportunity for discussion of issues.

The study team felt that institute administrators and headquarters staff of the Division of Manpower Development were persons of great committment, possessed enormous capacities for hard work, and should be complimented for their system's many progressive educational policies. They were quite aware of most of their problems and already had many activities underway to solve them. Amongst the qualities which are especially commendable are: the equal allocation of time for theory and practical sessions, the increased continuous assessment of students, and the democratic involvement of administrators, tutors, and end users of MATI graduates in dialogue and policy recommendations at the Annual Agricultural Training Conference.

2. Program

a. Curriculum

The curriculum is defined as all the experiences which are offered to learners under the auspices and direction of the institute. If one asked a MATI principal to show one the curriculum, he would probably produce an outline called the syllabus which reveals essentially the program of studies aspect of the educational program. The syllabus is only a listing of topics offered and the allocated number of hours for each. Activities such as sports, interest clubs, service clubs, assemblies, dances, etc., are not usually indicated as part of the curriculum. Many other student welfare and guidance activities are routinely conducted at each institute but are not regarded as curricular.

The aims and goals of an agricultural training institute express the views of its tutors, administrators, the end users of the institutes' graduates, and of officials of the Ministry of Agriculture regarding what sort of institution it should be and what sort of work it should do. From those aims, curriculum offerings are built.

Curriculum improvement refers not only to improving the structure and the documents of curriculum but also to the stimulation, growth, learning, and alteration of perceptions and values of all persons who are concerned with the curriculum. This means that curriculum improves largely in consonance with improvements in the tutors' insights, skills, and attitudes.

Seven MATIs operate Certificate courses which schedule 40 hours of classes per week over 34 weeks, half Practical and half Theory. About 6 additional weeks are spent on a field practical experience and three weeks are taken up by final examinations and review. Commonly added to the 40 hour week are 1½ hours per day of early morning practicals for some or all students; 2 to 4 hours of tests on Saturday; occasional work periods on self-reliance projects,* such as growing maize for student use; occasional participation in a village project; evening sports activities; and night study.

*This activity is sometimes undertaken during the 40 hours of time scheduled for classes.

The Diploma courses usually have about 35 hours per week of scheduled classes and are involved in most of the other aforementioned activities as well. Thus, students are usually engaged in 40 to 50 hours of educational activity per week exclusive of sports and study time. Some MATIs add evening practicals and weekend village block assignments as well.

The courses of study at MATIs are shown in Exhibit IX-A. The present division between Certificate and Diploma students attending MATIs is about 50% for each level. In the past it has been 64% Certificate and 36% Diploma. The current proportions reflect a temporary short term effort to give the large backlog of experienced and qualified staff an opportunity to secure Diploma credentialing. The proportions requested for the 1980s by field administrators interviewed in this study are 74% Certificate and 26% Diploma as revealed in the preceeding chapters.

b. Syllabi and Their Revision

A syllabus is that part of the curriculum which deals with instruction. It is a listing of all the subjects to be covered during the course, with the amount of time to be spent on each. Being the most importnat part of the curriculum, it is imperative that the procedures for its construction and review be very carefully laid down. Ideally, syllabi are based on the application of educational principles to subject topics. And the subject topics themselves should normally be based on field surveys of job tasks which end users require of their employees. Such a survey would include not only knowledge and skills, but also behaviors and attitudes needed by the graduates of each course.

c. The Agriculture/Veterinary (Agro-Vet) Certificate Course

Prior to 1976, MATIs produced specialized Certificate holders for village extension and other work, mostly crops and animal health specialists. Each agent typically served several villages via infrequent and overlapping contacts. Assistance with animal husbandry has unfortunately tended to be relatively neglected in both crops and veterinary fieldwork, as well as in their curricula.

In 1976, in keeping with the Ministry of Agriculture's goal to place a Bwana/Bibi Shamba in every village, it was decided to combine the general agriculture and veterinary

Exhibit IX Courses of Study Offered at MATIs, Their Objectives and Total Student Enrollments 1978-79

COURSE	NUMBER OF STUDENTS (1st and 2nd year)	MAJOR OBJECTIVES OF THE COURSE
Diploma		
Animal Health	34	To provide veterinary assistance to village extension agents in the district and to advise on disease control at district and regional levels.
Animal Production	127	To provide regional and district level specialists in the area of livestock production to support village extension agents as necessary.
Agro-Mechanics	84	To provide specialists at district or regional levels dealing with mechanization programs.
Crop Production	271	To train regional and district level specialists in crop production to support village extension agents as necessary.
Farm Management	40	To train students to perform the duties of a farm manager in state farms and in research and training institute production farms.
Agro-Home Economics	27	To produce home economics specialists for employment at regional and district levels who will plan and organize nutrition, health, textiles, gardening, child care, home management and other related programs for rural women and will recruit and train volunteer support staff.
Horticulture	26	To train specialists for district or regional level work who will support village extension workers in fruit and vegetable culture.
Human Nutrition	41	To provide nutrition specialists at district or regional levels to support village extensionists in their nutrition extension programs.
Irrigation	68	To prepare subject area specialists who will work at district or regional levels planning and executing irrigation projects in their areas.
Range Management	38	To train specialists to plan and execute rangeland management programs in their areas.
Tsetse Control	--	To prepare specialists to work under the National Tsetse Control program.

COURSE	NO. OF STUDENTS ENROLLED IN 1979	MAJOR OBJECTIVES OF THE COURSE
Certificate		
Agro-Vet	937	To prepare multi-purpose extension agents who can teach farmers modern methods of both crop and livestock production.
Land Use Planning	119	To train land use planners who can plan the best use of land in the villages without running it down.
Laboratory Technology	31	To provide trained lab technicians who can work in veterinary investigation centers and in training and research institute laboratories.
Short Courses		
Retraining	140	By giving 3-months of veterinary and animal husbandry training to crops extension agents and by giving crops training to veterinary extension agents, enable them to function as multi-purpose extension agents equivalent to the agro-vet.

certificate syllabi, thus forming the present agro-vet syllabus. The aim was to produce multi-purpose extension workers who would be able to deal with both crops and livestock issues. The following benefits were hoped for: (1) it would require only one extension worker per village and thus cost less; (2) the Bw/Bibi Shamba could live in the village, thereby developing rapport with people and an in-depth working knowledge of the local agricultural situation; (3) it would reduce the possibility of different specialized extension workers giving contradictory advice or instructions to a farmer; and (4) it would lead to farmers' situations and needs being evaluated and assisted as a whole so that the household's enterprises would better complement one another. This did not mean that the Bw/Bi Shamba would possess ready answers to all of the farmers' crop and livestock questions. Rather, his/her roles could be to teach farmers to adopt a few simple practices and to contact specialists working in District offices to tackle more highly technical problems such as diagnosing and controlling disease outbreaks.

The agro-vet syllabus was conceived and introduced with very good intentions, but is was done hastily without the strong foundation it needed. It lacked a number of essential ingredients for successful implementation. Amongst these should be listed the following: making or reviewing field surveys to find out what farmers need and want; holding discussions with employing organizations to get their opinions; involving subject matter specialists, including researchers, to provide the latest technical facts; and consulting with the highest levels of Ministry of Agriculture staff.

In addition, the new syllabus was not accompanied by the mass orientation that was needed to introduce such a major change. Resistance to the curriculum has occurred at nearly every level. It has come from students who prefer the status of specialization and the better chance it provides for further study. It has come from the end users who feel that generalists can not function well in their area of concern;* and it has come from many tutors who feel they now have far too little time in which to teach their topics.

*The Bw/Bi Shambas are still attached to either a crops or livestock officer at district and regional levels. These personnel are concerned with supporting their specialized programs. The continued rejection of multi-purpose extension workers by these key people will likely assure the failure of this new curriculum and its graduates.

During informal discussions, comments from former Bw/Bi Shambas (now Diploma students), seemed to indicate a serious lack of pride and dignity in the role. This indicated a lack of sufficient professionalization, and in some cases, the holding of unrealistic goals for further training. Extension work seemed to be viewed as a temporary assignment which should be escapable within two to five years.

The principals and tutors interviewed in the study almost unanimously felt the present multi-purpose certificate syllabus is: (1) greatly overcrowded, partly irrelevant and too theoretical at points; (2) lacking in specificity or definition (confusing tutors as well as students who must prepare for national examinations); and (3) lacking a job description for the contexts within which students would apply their learning. Because the agro-vet syllabus is tremendously overcrowded and often vague, tutors seem to use most of their limited time to "give information" or notes. Too little time has been left for thorough topic coverage and sufficient problem-solving practice; both of these are considered necessary for a qualitative practical education.

In light of these events and critiques it is believed that the focus of the present syllabus must be: (1) narrowed and (2) made more directly applicable to the extension agent's role in the villages. The study team places the need to seriously revise the agro-vet syllabus among the two or three most urgent tasks for the Division of Manpower Development to undertake. The Division has already initiated some activity aimed at such revision.

As the chapter on manpower utilization efficiency and effectiveness notes, generalist extension agents are not recommended. Regardless of whether or not this view gains support, there is an important short term need to revise the present syllabus.

Recommendation No. 11 : The present syllabus should be considerably narrowed and trimmed to allow adequate time for students to master new learningandto develop insights, understanding and confidence needed for effective field work. This will come about only when there is adequate time for practicing applications of learning in the classroom and in practicals. The trimming can be accomplished by:

(a) Elimination of those topic areas found to be seldom used by village extension

workers, such as fisheries and rubber production. If an extension agent later finds that he/she needs to assist his/her villagers with a fishery unit, he/she could be assigned briefly to a district having fisheries or be given a short course, on-the-job training, or specialist assistance.

(b) Elimination of some theoretical coursework which goes beyond what an extension worker must know of fundamental principles in the sciences.

(c) More specification of the depth, content, and rate at which subjects should be taught.

With regard to the demand for animal health specialized certificates at state farms, research centers, VICs and parastatals, a specialized program could be resumed to cater for such requests. These could be similar to the present land use planning specialization which has been retained.

Recommendation No. 12: A proper position description for the Certificate graduate should be developed based upon the Manpower Utilization section's discussion of roles and functions. This would help to provide a realistic context for syllabus revision.

Recommendation No. 13: It is proposed that the multi-purpose course be renamed "Certificate in Agriculture," and that the usage of the agro-vet term be discontinued as inaccurate and misleading.

In the process of the above recommended syllabi revision, there should be a major effort at constant dialogue on the issues. The Division should engage staff, students, and end users in positive discussions for the reshaping of syllabi. With such an approach, the curriculum changes will find themselves well understood and more likely to receive widespread acceptance.

The present multi-purpose syllabus, by listing topics and sub-topics in textbook format, tends to encourage the teaching of agricultural science in its pure technical form, largely unrelated to the social, political, cultural, and economic dynamics of the village where students must eventually practice their extension profession. Therefore, Recommendation No. 14 urges that these interacting dynamics and their relationship to

to the extension function should be reflected over and over in the revised syllabus, in topic manuals and lesson plans. Villages should increasingly be utilized as training laboratories to add this dimension to training. The syllabus should specify abundant activities to be undertaken in villages, for staff and students to fully appreciate and benefit from villages as real-life training opportunities.

The new syllabus should produce professional extension workers rather than agricultural technicians. All training should become extension oriented and be so reflected in the course syllabus. For example, dairy production courses should emphasize potentials and problems of dairying, successes and failures in Tanzania to date, suspected causes of each, including the human errors Bw/Bi Shambas should avoid and the precautions they should adopt.

Recommendation No. 15 : The curriculum should incorporate value orientations and constant reminders to students that their future roles are those of extension workers rather than agricultural technologists. Training should help them view their extension roles with pride, develop deep commitment to them, and develop reasonable expectations regarding opportunities for further studies.

Recommendation No. 16 : In order for the Certificates in Agriculture to be accepted and successful in the field, all agricultural staff must receive thorough orientations regarding the curriculum, what can be expected from the graduates, and what the best approaches are for supporting the graduates in the field with on-the-job training. This is especially important in light of the assignments to either crops or livestock branches of agriculture.

Recommendation No. 17 : The above recommended "applied" approach to the general Certificate curriculum will leave graduates somewhat weak in the basic science that will be needed by those who will undertake Diploma coursework in the future. Such a deficit could be recovered through a pre-course refresher unit in science and mathematics at the Diploma level.

Recommendation No. 18 : The subject area most often identified as being weak by field staff who were asked to evaluate their own training was administration. This area

will require strengthening in the revised syllabus, and through improved orientation training.

Recommendation No.19 : Students should be given a few hours of instruction on "How to Study" as part of their first year orientation upon entering a MATI. An effective lesson plan should be developed to do this, and then disseminated throughout the MATI system.

d. Diploma Courses and the Curriculum Revision Process

At the moment, there are 10 Diploma courses being offered at 8 different MATIs. The syllabi for these courses are reviewed regularly by MATI and Headquarters staff. The Agricultural Education study team did not have the necessary time to evaluate each course syllabus. There were some responses from respondents surveyed at Uyole and Ilonga that indicated some dissatisfaction with the Home Economic and Human Nutrition courses, and the field assignments made of graduates.

Recommendation No.20 : The end users of MATI graduates should be better represented in curriculum planning and review committees because they are the ones who know best the strengths and weaknesses of the MATI products. On the other hand, by participating in these committees, they will become more aware of how best to utilize the Diploma and Certificate holders working under them. Had this been done sufficiently in the past, more regional officials might now have concrete programs under which Agricultural Home Economics and Human Nutrition Diploma holders could be fully utilized.

Recommendation No. 21 : The Division of Manpower Development might consider requesting the formation of a working group to study the nature of the need for Home Economics and Nutrition courses, adjust outputs accordingly, specify the job tasks required to be performed, and advise changes in curriculum, and to ensure appropriate work assignments and expectations.

e. The Retraining Program at MATIs

Recommendation No. 22: A thorough analysis should be made of the retraining program which is designed to convert formerly specialized Certificate field workers into generalist extension agents. There is evidence of poor learner motivation, of disinterest by supervisors in selecting for and promoting the program, and a disinterest by both in making use of the training upon return to the field. If the program is to continue (which the Utilization analyses do not advocate), the Ministry should orient its staff throughout the entire system regarding the purposes, the philosophy and the judgements behind the policy of training generalists at the Certificate level.

To have general purpose training and general purpose village work accepted by field staff, they must be oriented to recognize the necessity of workers living in the villages they serve and being accountable to the villagers.

The Division of Manpower Development should consider lengthening the three month term of the course for greater impact. In addition, although some students are motivated to try for high marks by the hope for Diploma study, the Division should search for more rewards for course graduates. Achievement awards or certificates may help; however, a small post-course salary increase would probably be more effective. Lastly, it may be prudent to group students by ability to accomodate the wide range of backgrounds and abilities represented.

f. In-Service Short Courses and Seminars

Recommendation No. 23: MATIs should offer more refresher short courses for extension personnel in their districts, regions, and zones. The study provided a training needs assessment through the questionnaire's Table 6b, which inquired what short term courses were needed by end users at each educational level and specialization. Exhibit IX-B summarizes the findings about needed short courses as perceived by supervisory managers. These are considerable, and demonstrate the enormous backlog of practical training requests which operational managers feel are required by their subordinate staff in order to improve performance. Each MATI in the system could be more fully utilized as an agricultural center where teachers, researchers, headquarters specialists,

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SPECGRPS SPECIALTY GROUPS BY EDLEVEL EDUCATION LEVEL

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Exhibit IX-B: Summary of Short Term Training Requests by Specialty Group and Education Level as of June 30, 1979 (Part 1)

SPECGRPS (EDLEVEL → COUNT / COL PCT)		IMERIT 1.	CERTIFICATE 2.	DIPLOMA 3.	B.SC. 4.	PGD 5.	MASTERS 6.	PH.D. 7.	ROW TOTAL
0.	Count	0	0	5	0	0	0	0	5
	Col pct	0.0	0.0	1.9	0.0	0.0	0.0	0.0	0.3
1. CROPS-GENERAL	Count	160	548	56	39	0	0	0	803
	Col pct	53.9	45.4	20.8	24.7	0.0	0.0	0.0	41.2
2. CROP BREEDING	Count	0	3	0	0	0	0	0	3
	Col pct	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.2
3. CROP PROTECTION	Count	1	58	9	7	0	0	0	75
	Col pct	0.3	4.8	3.3	4.4	0.0	0.0	0.0	3.9
4. HORTICULTURE	Count	0	99	18	4	0	0	0	121
	Col pct	0.0	8.2	6.7	2.5	0.0	0.0	0.0	6.2
5. SOIL SCIENCE	Count	0	2	0	1	0	0	0	3
	Col pct	0.0	0.2	0.0	0.6	0.0	0.0	0.0	0.2
6. ANIMAL SCI-GENL	Count	25	71	21	4	4	4	0	129
	Col pct	8.4	5.9	7.8	2.5	66.7	50.0	0.0	6.6
7. ANIMAL HEALTH	Count	75	59	26	0	0	0	0	160
	Col pct	25.3	4.9	9.7	0.0	0.0	0.0	0.0	8.2
8. ANIMAL NUTRITION	Count	0	6	1	0	0	0	0	7
	Col pct	0.0	0.5	0.4	0.0	0.0	0.0	0.0	0.4
9. ANIMAL BREEDING	Count	4	44	0	3	0	0	0	51
	Col pct	1.3	3.6	0.0	1.9	0.0	0.0	0.0	2.6
10. RANGE PASTUREMGT	Count	0	4	1	0	0	0	0	5
	Col pct	0.0	0.3	0.4	0.0	0.0	0.0	0.0	0.3
COLUMN TOTAL		297	1208	269	158	6	8	1	1947
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.4	0.1	100.0

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SPECCRPS SPECIALTY GROUPS BY EDLEVEL EDUCATION LEVEL
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Exhibit IX-B: Summary of Short Term Training Requests by Specialty Group and Education Level (Part 2)
as of June 30, 1979

EDLEVEL

SPECCRPS / COUNT / CELL PCT	1. MERIT	CERTIFIC ATE	2. DIPLOMA	3. B.Sc.	4. PGD	5. MASTERS	6. PH.D.	7.	ROW TOTAL
11.	6	21	7	0	0	0	0		34
HIELS /NL MGT	2.0	1.7	2.6	0.0	0.0	0.0	0.0		1.7
12.	0	0	0	13	1	0	0		14
VET SCI-GENERAL	0.0	0.0	0.0	8.2	16.7	0.0	0.0		0.7
13.	0	0	3	0	0	0	0		3
TECH SPECIALTIES	0.0	0.0	1.1	0.0	0.0	0.0	0.0		0.2
14.	0	92	55	53	0	0	0		200
AGRIC ECONOMICS	0.0	7.6	20.4	33.5	0.0	0.0	0.0		10.3
15.	7	37	16	10	1	0	0		71
AG ENGINEERING	2.4	3.1	5.9	6.3	16.7	0.0	0.0		3.6
16.	2	29	9	5	0	0	0		45
IRRIGATION	0.7	2.4	3.3	3.2	0.0	0.0	0.0		2.3
17.	0	15	5	2	0	2	0		24
HOME EC-FOOD SCI	0.0	1.2	1.9	1.3	0.0	25.0	0.0		1.2
18.	15	11	12	5	0	1	0		44
AGRIC EXTENSION	5.1	0.9	4.5	3.2	0.0	12.5	0.0		2.3
19.	0	9	6	3	0	0	0		18
AGRIC EDUCATION	0.0	0.7	2.2	1.9	0.0	0.0	0.0		0.9
20.	1	40	6	3	0	0	0		50
TRAINING STATUS	0.3	3.3	2.2	1.9	0.0	0.0	0.0		2.6
21.	1	16	4	6	0	1	1		29
RESEARCH	0.3	1.3	1.5	3.8	0.0	12.5	100.0		1.5
COLUMN TOTAL	297	1208	269	158	6	8	1		1947
	15.3	62.0	13.8	8.1	0.3	0.4	0.1		100.0

(CONTINUED)

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FILE AGNAME (CREATION DATE = 02/15/80)

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SPECORPS SPECIALTY GROUPS BY EDLEVEL EDUCATION LEVEL
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Exhibit IX-B: Summary of Short Term Training Requests
by Specialty Group and Education Level (Part 3)
as of June 30, 1979

COUNT / COL PCT	EDLEVEL 1.0 MERIT	2.0 CERTIFIC ATE	3.0 DIPLOMA	4.0 B.SC.	5.0 PGD	6.0 MASTERS	7.0 PH.D.	ROW TOTAL
SPECORPS 23. MISCELLANEOUS	6 4.0	44 3.6	9 3.3	0 0.0	0 0.0	0 0.0	0 0.0	53 2.7
COLUMN TOTAL	297 15.3	1206 62.0	269 13.8	156 8.1	6 0.3	8 0.4	1 0.1	1947 100.0

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and regional and district personnel can combine to up-date field workers, and exchange information. As noted in the information on MATI facilities presented in Chapter IV, there is considerable spare capacity expected to be available in the years to come which would be available for short courses. In addition, as will be noted subsequently in this chapter, the teaching loads at many MATIs are not excessive, and spare training capacity is available for the suggested expansion of short course offerings. There is so much valuable short course work to be done that MATI involvement would in no way duplicate the efforts of the proposed new training farms, nor the University's Center for Continuing Education.

Recommendation No. 24 : Short course curricula should normally be built around the introduction of extension package innovations which are based on the existence of technically and economically viable recommendations, and that respond to farmer felt-needs. Such investments in educational short course programs are far more likely to give high returns than general background courses. This is because the training process can be focused around a limited range of learning and skills practices that do not overwhelm students. In addition, by being centered on a viable package of value to the targeted farmers, it will be more possible to measure the extent of impact created. As noted in the utilization chapter on efficiency and effectiveness in extension services, specialized courses which prepare extension agents properly to carry a tested recommendation to the farmers are essential to successful work. This is based on the well-known Training and Visit system, and other similar work programming and control mechanisms. Such specialized in-service short courses related to particular action programs appear in the literature as a consistent part of successful extension programs across the world.

g. On-Job-Training Support Services

Recommendation No. 25 : As part of the desired effort to engender close and collaborative linkages amongst all agricultural organizations, MATIs should assist regional and district agricultural and livestock officers with contributions to on-the-job training efforts for their subordinates. This might mean providing occasional

lecturers for a day, assistance with teaching materials, or the loan of audio-visual equipment and materials.

h. Final Examination Procedures

(i) Situation

Beginning with the colonial period, final examinations have held a high place among educational activities in Tanzania. Moderation Boards were established to ensure that the examination questions were clear, practical, appropriate in content, and were provided with suitable model answers and marking schemes. Examination Boards were established to check the fairness of marking and the accuracy of tabulation, as well as to judge passes, failures, distinctions, credits, and awards. Each Board may have 1 to 12 members from outside of the MATI. Many members come hundreds of miles at great expense in funds and time.

In recent years, however, the enlightened addition of rigorous continuous assessment has made the final examinations less awesome. In the agro-vet course, only 40% of the final theory marks and 20% of the final practical marks (30% of overall paper marks) now come from the final examinations, the remainder coming from continuous assessments.

Since 1978, the first year agro-vet Certificate course has had a national or common final examination. This allows a comparison of marks among MATIs, topic by topic, and maintains a useful pressure on the topic tutors and MATI administrators. However, the common examination requires that a large marking board be maintained at one site for several exhausting weeks at great expense. In 1979 the total costs of conducting the exam were Shs. 242,981, excluding fixed costs such as tutor labor.

The common examination is also criticized for its tendency to compare the quality of education at various MATIs when some have far less equipment, tutors, crops and animal specimens than do others. Also, the chance for "leaks" is much higher than otherwise. The practical questions become known to tutors some hours before the sitting, to allow tutors to prepare the exercises. Information leaks to students could be tempting

to some tutors, in order to have their classes do well in comparison with those at other MATIs. Lastly, the present agro-vet syllabus is so lacking in specificity as to leave every tutor vulnerable to questions being asked which have not been covered with his or her particular students.

Regardless of where final examinations are done, whether national or not, they and their related support activities as now practiced put an extraordinary work strain on the staff throughout the Manpower Development Division. They dominate and detract from all other activities, many of which are at least equally important to the quality of education.

Given the shortage of funds, even to conduct field trips and village practicals, given Headquarters staff's insufficient time to assist MATIs adequately in improving their quality of instruction, given the lack of time for tutors to conduct consistently good practicals at the MATIs, and given the indications of flagging morale and boredom of tutors, it makes sense to simplify these elaborate and formalistic procedures.*

The justifications for formal examination procedures would seem to have decreased in recent years. Less weight has been given to the final exams, the educational level of tutors has improved, and the MATIs have expanded into larger and more sophisticated systems where a student's exploitation by one tutor (should such an event occur) would not greatly affect the student's marks overall. In addition, the implied distrust of tutors in having others examine their questions and their marking was found to be irritating to some tutors who were surveyed.

(ii) Recommendations Regarding Examinations

Recommendation No. 26: It is recommended that for the present, the Moderation and Examination Board functions continue, but that they be simplified for other than national**

*41% of all tutors surveyed in this study said they would prefer to be assigned to other duties;and 27% said they like teaching "not at all" or "not very much". 51% of tutors surveyed said they do not use teaching methods other than lecturing.

**See responses by MATI Principals and Coordinators of Study, Part I, Quest. #13b in the Agriculture Education Section Appendix.

examinations. It is recommended that locally held moderation functions (non-national) be conducted by an informal board consisting of (1) a representative of the Manpower Development Division (this person could be a MATI appointee, a Headquarters staff member or other), (2) the MATI Coordinator of Studies or Deputy Principal, and (3) one department head at a time (the person whose department's papers are being moderated). The department head would be able to provide the topic expertise necessary. The Coordinator of Studies would provide expertise in test construction and syllabus content, while the Manpower Development Division's representative could complement these skills and insist on an appropriate standard of excellence. Because of the smallness of the group, the voluminous examination questions, model answers and marking schemes would not need to be mimeographed for the moderators as is now usual.

It is recommended that the external and internal examiners' function be carried out by an identically structured group except for the formal board meeting which should be participated in by all members of the local staff.

The adequacy of marking of examination papers should be evaluated by appropriate department heads except that the topics (papers) that they personally taught and marked would be investigated by the Coordinator or the DMD's representative. As internal examiners, the department heads would learn more about the teaching and marking being done by their staff members. The DMD's representative as the only external examiner would need to spot check, advise the MATI regarding needs for improvement, and report to DMD. There would be no need to sacrifice quality. The examiners could concentrate on reviewing the marking of less well-trained tutors and that of tutors known to be least conscientious.

Recommendation No. 27 : When the MATI staffs eventually become upgraded to a high percentage of B.Sc. or higher qualifications, the complete disbandment of the moderation and external and internal examiners' functions is recommended, possibly substituted for by a single visiting inspector. These functions are not needed when one has reasonable confidence in the school staff and administrations, and when continuous assessment is the major evaluative tool.

Recommendation No. 28 : Continuous assessment provides a strong and constant motivation for study, if it is allowed to carry the weight it deserves. It should eventually contribute 80% towards the final overall marks of papers, rather than 70% as now.

If three hours are spent taking theory tests each week for 34 weeks, and if final theory examinations are 3 hours each times 12 papers, then about four times as much effort is expended in continuous assessment as in final examinations. Thus the 40% of theory marks now supplied by final examinations is excessive, not undervalued as some tutors have assumed.

Recommendation No. 29 : It is recommended that the common examination for the agro-vet course be discontinued. It is assumed that in spite of some reasons for its continuance, that the money and energy expended would have more impact on quality of education if used toward teaching materials, petrol, conferences, workshops, visits by Headquarters staff, and tutor training.

Recommendation No. 30 : In view of the considerable efforts and financial costs incurred by resit examinations, in view of many continuous assessments having already servedasalong series of "second chances" for students, and in view of provisions for students to repeat an entire year of study, it is recommended that the resit examinations be eliminated completely.

Recommendation No. 31 : With the elimination of resits and the simplification of moderation functions, the locally administered examinations should require the writing of only one and one-half sets of carefully developed questions and answers. Where major deficiencies are found by the 3-person Moderation Baord, the responsible tutor would be asked to improve the questions or to write new ones. There would be no need to compromise quality.

The simplified approaches to final examinations recommended here put responsibility where it belongs -- on the local staff. They would reduce the human and financial costs of these functions by about two-thirds, at a time in the academic year that is an annual nightmare; yet they can continue to provide adequate quality control and protection for students. The writers believe that these approaches will improve tutor morale, and that

they will liberate the staffs so they can get on with their more important work, that of teaching well.

i. Teaching Methods and Materials

The MATI administrators who were interviewed unanimously identified unproductive teaching methods as major weaknesses in the educational process, especially with regard to practical instruction. Students were somewhat less critical. Sixteen percent of 967 students questioned said, "Most tutors know their subjects well". 56% said, "Some know them well," while 28% said, "Few know them well." The response pattern was similar to the question, "How well do your tutors teach (1) theory classes and (2) practical classes?" However, 37% said of practical class teachers that, "Few teach very well."

(1) Theory Teaching

In that only 19% of 267 tutors surveyed had had any professional or pedagogical training, and in the absence of student textbooks, etc., it is not surprising that 51% said that they do not use"other than lecture methods" of instruction in theory classes. The students in many MATI courses, especially in the overcrowded agro-vet Certificate course, are apparently being presented new facts, principles, and concepts at a near maximum rate during the 18-24 theory periods assigned per week. Thus, there is often little time left for problem solving applications of the theories taught.

Students are assessed or tested routinely through one to three lengthy unit tests per week according to Division policy. A unit is not usually retested until the end of year examinations. However, a body of material would normally need to be studied more than twice for good understanding and lasting learning.

Note-giving on the chalkboard is somewhat necessitated by the absence of individual textbooks or student manuals. Students must have and do demand an organized body of notes in order to prepare for tests and to serve as an on-job reference. "Note giving" may also be perpetuated because more creative methods are not suitable for some of the large classes found. (Class sizes up to 112 students do occasionally occur due to local institute circumstances.)

It should be noted that problem-centered instruction has been recommended at training conferences and has been tried by some tutors. There is some evidence that MATI graduates at the Certificate level in particular, are weak in problem solving, innovativeness, critical thinking, ability to grasp overall situations having many interrelated parts, in overall program development and follow through. In brief, they are thought to be well supplied with facts but somewhat short in their ability to apply them.

Recommendation No. 32 : It is recommended that the Division of Manpower Development carefullly plan and mount a long-term, multi-faceted and concerted effort aimed at improving the quality of instruction in the MATIs. Staff at all levels need to participate in orientation and training aimed at developing insights, skills, and commitments necessary to achieve quality teaching. Tutors must then be given the assistance and supervision needed to make major changes in teaching methods and approaches. The remaining recommendations in this section are mostly specific ways to implement such a long-term campaign for improved instruction.

Many tutors are using lecture notes largely devoid of facts, statistics, problem examples and recommended practices currently employed in the field. Therefore, Recommendation No. 33 : suggests that knowledgable technicians participate with tutors in the development of topic manuals for staff and student use which, when used as the major referenceswill ensure that appropriate and uniform content is taught. The manuals should be limited in content to no more than students need to know and no more than can be learned to a mastery level. This effort is already underway in the Division.

Ideally, topic manuals would be provided to each student so that the present time-consuming "note giving" could be largely by-passed in teaching, so that students could participate avidly in class discussions and problem solving exercises, having already read the unit being discussed. If kept by students after graduation, the topic manuals would serve as handbooks for reference on the job.

Recommendation No. 34 : It is also recommended that instructional modules or tutor guides having comprehensive unit plans be developed for every topic to lead tutors to use

improved methods following training on their use. Forty five percent of all tutors surveyed said tutor guides would be "very useful" to them , and forty percent said they would be "somewhat helpful." All Coordinators of Study interviewed felt tutor guides would be helpful.

Each unit and lesson plan in the tutor guides should include: statement of objectives, the time required to teach, the recommended methods of instruction and how to use them, recommended examples, questions, exercises, references, materials, audio-visual aids, specimens, and assessment schemes.

A team of experts should be assembled to include two or more experts external to the Division as is presently being discussed. The curriculum development work groups should test their evolving drafts in the classrooms as a normal step in materials development. They should confer with tutors to gain additional insights and ideas for improvement as well as to legitimize the idea. They should attempt to role model the desired tutor behavior in the use of improved materials and methods.

Recommendation No. 35 : Theory instruction must stress the applications of newly learned principles, concepts, facts, skills, and attitudes to ensure that graduates can function in difficult situations and roles. It should stress problem solving by means of the tutor's questions leading students to self discovery of solutions or insights. The importance of idea and experience sharing via discussions and seminars, and the use of group/individual assignments to develop skills and confidence should be emphasized. Role playing should be utilized in such topics as extension to add vividness and impact to theory teaching. Similarly, small group sessions can be employed as problem solving work groups in which each reports their decisions to the whole group. Home study, student recitation, classroom demonstrations and exhibits of specimens and test items which call for understandings as well as applications should be stressed. The Division of Manpower Development's present policy insists on examination questions dealing with practical applications. The next step is wider dispersion of modern methods in actual training operations.

It is not recommended that tutors cease to lecture. The discussion/lecture method is often suitable, but additional methods are necessary to ensure that extension agents can

perform well in the villages.

Recommendation No. 36 : For the kinds of methods advocated to produce good results, classess or streams must be limited to 40 students each. Eight streams of 40 students produces the 320 student figure advocated as the minimum size of a potentially more efficient MATI.

Recommendation No. 37 : Home reading assignments (mostly in the students' manuals when developed) will need to be done prior to classes for discussion and problem solving methods of instruction to work at their best. These manuals will release time that would otherwise need to be spent lecturing. Class recitations with tutor assessments or short quizzes will be needed to ensure that such home assignments are read. A system of teaching requiring home reading, class recitations, class discussions, problem solving exercises, and repetitious testing will result in lasting and useful learning. When home reading assignments become common, the number of weekly theory periods will need to be reduced to allow more study time. Increased self learning is especially recommended for Diploma students.

Recommendation No. 38 : At the end of each year, the MATI staffs should thoroughly and formally evaluate their past year's academic program, preferably with assistance from Headquarters staff,and make appropriate corrections in it for the next year. In addition, the teaching performance of every tutor should be evaluated by students and supervisors once per term. Appropriate forms for securing feedback which can be translated into positive actions that can be taken to strengthen weaker performers must be developed sensitively in conjunction with tutors. Evaluation forms which do not have the understanding and support of tutors, and which have not been designed with their participation, will not normally be effective.

It is recommended that new tutors monitor their teaching performance within a month of beginning their duties. The student-kept teaching diary should indicate not only the major subjects taught, but the methods used. This would help administrators to better evaluate teaching. Student evaluations of tutor performance should also be used.

Recommendation No. 39: Tutors and administrators will find it essential to reorient students' expectations regarding methods of teaching prior to making changes. Student awareness of the reasons for changes, what is expected of them, and how their performance will be judged will need to be thoroughly discussed and explained. Otherwise, there will likely be considerable resistance to such innovations. This is because some changes might become perceived as threatening their ability to successfully achieve their educational goals. Demonstrating how their goals can be achieved even more effectively would be an important part of the whole effort.

Assessment of Theory

The theory tutor must be provided adequate time to prepare himself if he is to be expected to teach creatively and well. Thus, it is recommended that division staff work out simplifications for the present labourious requirements regarding: continuous assessments, final examinations, standardization of marks and reporting.

The all-essay tests commonly administered often require 30 minutes per paper to mark. Tutors can reduce the marking (grading) load from continuous assessment by 50% of more by using up to half multiple-choice matching and short answer questions in the weekly tests. These are not inferior types of questions if well designed. Tutors will first need considerable practice in an instructional setting to master their construction, however.

Further, tests need not be long to accomplish their two major purposes: (1) to evaluate students and (2) to motivate students to study. Frequent testing is a first rate method of teaching. Tests should continue to be scheduled often to keep students working without release. A 40 minute test per topic per setting, only half essay, is recommended. Only then will tutors have the additional time and energy to put into more creative instructional materials development.

Following weekly assessments, it is very important that tutors post the model answers, the marking scheme, and the correction factor for standardization, if any, so students can see them. The sooner this is done, the more meaningful it is to students.

The study team offers no opinion regarding continuing or discontinuing the standardization of marks as its advantages and disadvantages more or less balance out. The best

alternative might be to impose a 5-point scale (A B C D F or I II III IV V) on distributions of marks from each test, then set allowable percentages for each grade. For example, the top 10% of the marks might be given an A or I, the middle 40% a C or III, etc.

(ii) Practical Training

Tanzania's stress on practical learning has already been noted. Thus, policy commendably requires that MATIs generally devote as many scheduled hours to practical instruction as to theory instruction (twenty hours per week at the Certificate level). In addition, students often participate in the early morning (and sometimes evening) practicals, such as milking. They also participate from time to time in self-reliance amd village extension work and spend four to eight weeks in an extended field practical during their course. Thus, a Certificate student would normally be involved in about 50 hours and a Diploma student in 40-44 hours of scheduled learning activity per week, including Saturday tests.

The Division of Manpower Development has also required that 50 percent of the students' final grades result from practical training. No paper (topic) can be passed without acceptable student performance in the continuously-assessed practicals. Furthermore, students receive an important non-academic grade each term based largely on their attitudes toward discipline and work. Thus, where weaknesses exist in practical training, it is due in the main to breakdowns in the implementation of policy.

Practicals at MATIs, it is widely agreed, are on the average more poorly taught than are the theory classes.* The effort put into practicals by tutors at MATIs tends to be less than for theory instruction. The practicals are often poorly planned, leading to poor execution. Student practice is often limited or even missing. The exercise needed to teach a skill such as "building an erosion control device" is

* For detailed evidence, see Agricultural Education Appendix- Questionnaire Responses. See especially: Q. 2, 5, and 6 (Principals' Responses), Q. 5 (MATI Students'), and Q. 4 (Recent Graduates' Responses).

sometimes substituted for by a weaker exercise, such as "observing an erosion control device."

The reasons for weak practicals are many, but may include the following:

(1). Nearly half of the tutors surveyed had never had a field assignment and possessed only student and tutor experiences. This can lead to a lack of confidence and interest in practicals.

(2). Some tutors lack the commitment and innovativeness necessary to overcome or circumvent the many real obstacles in organizing and conducting quality practicals. There is a tendency to give up too easily.

(3). Long term planning is too often neglected so that needed materials are not obtained, according to the Coordinators of Study. Few tutors have developed complete lesson plans which list such items as "materials needed."

(4). There are far too many skills in the agro-vet Certificate syllabus, and in other syllabi, to realistically expect that tutors will be able to teach them thoroughly in the time assigned.

(5). Specimen collections, home-made models and demonstration kits, etc. are generally very inadequate. Thus, a MATI may not only lack coffee plants, but may not even have specimens of coffee insects, or of disease-damaged plant parts.

(6). Some MATIs are extremely deficient in the materials, equipment, facilities, supplies, and transport needed for practicals. There are usually ways to overcome such problems if one is extremely determined and innovative. Such attitudes and skills can be developed in tutors through training. Innovativeness displayed by tutors may serve as demonstrations to students who will also face shortages in the villages.

(7). Some tutors are too pressured time-wise to be innovative in overcoming obstacles.

(8). The practicals themselves are varied and do not easily fit into assigned periods or assigned seasons. The periods are often too short for demonstration,

student practice, and assessment.

(9). The size of classes is often too large to obtain effective hands-on practice and assessment during a practical.

(10). In some cases, practicals are taught by one tutor and theory classes by another. This may lead to a lack of proper coordination and resulting confusion. If a senior tutor is lazy or has little confidence, it is an easy escape to assign practicals to junior staff.

(11). Some improved teaching materials and audio-visual equipment lies idle at some MATIs. This occurs because tutors are not aware of their usefulness or how to employ them correctly.

The study team realizes that some excellent practicals are conducted. They also wish to express sympathy with those tutors who try hard but still fail due to circumstances completely beyond their control. However, the improvement of practical instruction would seem to be one of the major areas of need in the MATI system.

Recommendation No. 40 : The improvement of practicals will necessitate continuous stimulation from Headquarters. Obviously, efforts must be made to supply MATIs with the necessary equipment, facilities, staff, and funds. But equally important, supervision and assistance from Headquarters can assure that high quality plans for practicals continue to be developed and improved for all courses, and then to ensure that they are followed. This will require short, temporary duty assignments of teaching methods specialists a MATIs and coverage of the associated costs.

Recommendation No. 41 : The improvement of the practicals must deal with the improvement of the tutors. As noted subsequently under the resources section, it is essential to (1) carefully select new tutors with relevant field experience; (2) provide present tutors who have inadequate practical experience with two to six months of field assignment or substitute village involvement; (3) provide professional training to tutors; and (4) transfer some of the present discontented tutors.

Recommendation No. 42 : At each MATI, the principal, the coordinator of studies, the department heads, and even the topic tutor must each perform certain important preparational and supervisory duties. Among these are: seeing that long-range planning is done, followed by appropriate procurements, assigning tutors of practicals according to skills and interest, thoughtfully scheduling and grouping students, preparing specimens and training aids, and insisting on complete lesson plans being developed and used. Administrators who daily check and assist tutors show by their actions the great importance they give to practicals. The topic tutor, if he has helpers in the practicals, must be intimately and continuously involved, forming a team with his assistants.

Recommendation No. 43 : The Certificate syllabus should have a reduction made in the number of total practical skills to be taught so that the remaining skills can be dealt with in greater depth.

Recommendation No. 44 : Practicals require flexibility in scheduling. Whereas one practical may be conducted in one hour, another may take ten hours. Where one can be tightly scheduled, another may only be possible when the opportunity arises, such as performing an autopsy on a dead cow. One practical may require a wet season and another, a dry season situation. Thus, program development and scheduling should start with department meetings, and then proceed to be negotiated amongst all MATI departments.

Recommendation No. 45 : In most cases, students can be scheduled in groups of 15-20 as many skills are easily taught in groups this size. However, it is also strongly recommended that the departments further divide students into groups of seven to ten whenever it will increase the practice that students can obtain. This type of flexibility calls for close supervision at each level to ensure that sub-grouping is being done when needed.

Recommendation No. 46 : If students vary greatly in practical experience, as pre-service and in-service students do, it is recommended that they be grouped

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according to their experience and ability. The tutors can thus better meet the needs of all students, maintaining interest, discipline and a high level of learning.

Recommendation No. 47 : The MATIs should give consideration to scheduling four-hour blocks of practicals per day. This would allow one 4-hour or two 2-hour practicals per day to fit differing needs. It would put the larger MATIs in a position to have half of the students in classrooms each a.m. and p.m. for better facility use, and it creates an easy breakdown in the amounts of theory and practicals taught per week. Only the lunch hour would be affected by being moved forward.

It is further recommended that some practicals, such as the operation of farm machinery be individually scheduled during the non-class hours in lieu of scheduling all students during normal class hours and having most students wait for their turn. This is very wasteful of student time.

Recommendation No. 48 : Outreach programs which use local communities or villages as educational laboratories for joint learning by students, teachers, farmers, and researchers should be greatly increased. Joint projects conducted in villages will encounter the same kinds of problems that students will one day face as extension workers. Such experience can create the new awareness in tutors which will help direct teaching toward the application situations faced by Bwana/Bibi Shambas in a village. The creation of a professional extension worker is necessarily the task of every tutor, not just the "extension" tutor.

Village outreach will be successful only if it is fully supported by administrators, staff, and students. A great deal of orientation will be needed to develop the necessary commitment. In practice, it will be very difficult to transport people, to pay for the project expenses, to plan and have preparations readied on arrival in the villages, to get reliable support from villagers, and to schedule the four to eight hours per week needed. The proposed Farmers' Training Wings at four MATIs must lead the way in finding productive approaches to outreach programs.

Village outreach should be seen as a teaching method, not as a separate segment of curriculum. Most tutors could conduct some of their practicals in villages, often

working in teams, with the time taken from allocated topic hours. A student's plot of maize (project) in a village might also serve as an opportunity to train and evaluate him/her in surveying, ox plowing, in improved cultural practices, and in extension demonstrations (each in conjunction with the appropriate course tutor).

Recommendation No. 49: Tutors need to conduct general field tours regularly, using fields as near to the MATI as possible. The tutor should spend time in preparation, finding the incidence of pests and diseases, deficiency symptoms, water lodging, poor stands, good stands, etc. which he wishes to show and discuss. During the tour, he should question the students orally and by exercise sheet regarding what they observe, why, and what recommendations they can offer. The procedure also can assist in assessment. This method ensures that students develop abilities to analyze and solve real field problems and it motivates students well.

Recommendation No. 50 : Tutors should look for opportunities to use more long-range practical projects in their teaching. For example, a flock of chickens could be kept for six months or a horticultural plot cultivated for two years as at MATI Tengeru.

Recommendation No. 51: Even though the scheduled time is often too short for tutors, firstly to demonstrate, secondly, to have students practice the skills, and thirdly, to assess the practical, a great deal of time is often wasted at many practicals. In situations where several tutors are needed but only one is available, consideration should be given to the use of student demonstrators or student supervisors. Several of the more able students can be taught, and, in turn, can teach or supervise others in order to quickly involve many students in a practice situation. Only more thoughtful planning and scheduling can help solve the time shortage problem.

Recommendation No. 52: MATI staff should look for opportunities to develop practical skills in conjunction with the normal production or self-reliance activities at the MATI. It sometimes makes little sense to have hired tractor drivers plow and the MATI production fields while agro-mech course students simply practice plowing in a dusty practice field.

Recommendation No.53: In self-reliance and production farming at MATI, the staff should stress the development of efficient work methods and work habits. Such methods and habits are some of the most important outcomes of training, as village productivity is influenced tremendously by labor efficiency. At the Kilosa Secondary School, the survey team was shown a large maize field in which teams of three students using production-line techniques hand planted up to one acre of maize per hour. With proper planning, good organization, and work discipline, the productivity of many field activities can be greatly increased.

Recommendation No.54 : Many practical skills now listed in the syllabus as "competent level" skills should be re-listed as "confidence level" skills, for the purpose of being realistic. For example, one does not become competent in flood irrigation in one to two hours, or even in 100 hours.

Recommendation No. 55: Nearly all practicals can be and should be assessed, including early morning and evening ones, to motivate students. The increased number of practical assessments will also help to increase the reliability of the practical assessment process.

Recommendation No. 56: The four to eight week field practicals require better planning, supervision, and support than they are now tending to get. A committee should be appointed to thoroughly investigate the past successes and failures of practical assignments and to make recommendations for improving them. This could be done in conjunction with an Annual Training Conference.

3. ORGANIZATION AND ADMINISTRATION OF MATIS

a. Planning and Management of the MATI System

The Division of Manpower Development has made tremendous progress in recent years in developing policies, procedures, guidelines, and organizational structures

to direct the MATI system. It is felt, however, that a better balance can be struck in the control, supervision, and support provided by headquarters. The small, dedicated, and able headquarters staff seems to heavily absorbed in the procedural duties related to final examinations and graduation, and in the exercise of final authority over student selections, student discipline, and student and staff complaints. In some cases, control from headquarters may be too close, depriving institutional managers of the discretion needed to respond flexibly to practical problems, or leading to duplication of efforts between MATIs and headquarters. While headquarters staff members seem to be generally overextended, MATIs could benefit greatly from more technical support and direction in many areas of their operation. Generally speaking, the staff is keenly aware of the weaknesses in the Division, but lacks the human and capital resources to solve them all at once. It is a tribute to the Division that a majority of the recommendations in this report are already being implemented to some degree.

Recently a five-person Curriculum Development Section has been formed in the Division, opening new opportunities for useful assistance, supervision, and evaluation throughout the MATI system.

The quality of administration in the MATIs was difficult to judge from the brief survey made. However, the survey indicated that there may be several deficiencies. Nineteen percent of the tutors interviewed in the study said communications between staff and MATI adminstration is poor, while 29 percent of the students interviewed said the relationship between staff and students in generally poor. There were indications of insufficient supervision in the MATIs in general. The necessary committees were generally organized and functioning, though not all were performing well. Nonetheless, the study team members were very impressed by the depth of understanding of the educational problems and their potential solutions as shown by many MATI administrators.

Recommendation No. 57 : It is recommended that the time-consuming procedures relating to examinations, moderation, and examination board activities, the handling of student failures, etc. be simplified or be processed more bureaucratically so as to free the energies and funds necessary for headquarters to provide the additional support, supervision and training needed to improve instruction and management in the MATIs.

Enlarging MATIs will allow more professional treatment of staff and student problems so that headquarters will have less need to get involved on a case by case basis. Responsibilities such as handling student discipline problems can also be reduced by creating highly specific guidelines (even for punishment). Disciplinary committees which follow such guidelines are less likely to be challenged.

Recommendation No. 58 : The study team commends the recent establishment of a Curriculum Development Section. Members of this Section, the Chief Training Officer and other key staff members should visit MATIs more regularly and for longer periods, with specific improvement objectives in mind, but with a willingness to listen and and to share ideas on any topic. The headquarters staff can serve as both supporters and supervisors of the MATIs as long as their goal is perceived by MATI staff as improvement of the system. They can sympathize with problems, offer ideas, arrange for outside assistance, and provide direct services. However, they can also bring pressure to bear where agreed-upon goals, standards, and procedures are not being reached and followed.

The MATIs will need a great deal of assistance and guidance to develop and improve tutor training, village participation programs, classroom and practicals teaching, student manuals and tutor guides, and production and efficiency in self-reliance projects. Some forms of support for these activities are already in place, but more resources will be needed to make them adequate and effective.

Recommendation No. 59: Because of gross inefficiencies in the operation in the present small MATIs and because of the apparent low level of training which is going on

in some of them (especially practical training), it is most urgent that some MATIs be consolidated or enlarged through rapid growth to a minimum enrollment of 320 students or more per MATI (eight sections of 40 students each). A number of cost-effective benefits of consolidation can be expected. (1) Tutors will be able to carry heavier teaching loads due to multiple sections and will be able to teach more consistently and effectively in the subject areas in which they are most qualified to teach.* (2) Student-tutor ratios at present are 5.2:1 in the MATIs with more than 200 students and 2.7:1 for two MATIs where enrollment is less than 100 students. (3) With more and larger facilities and equipment available (farms, laboratories, libraries, etc.), it will be possible to raise educational quality and reduce the costs per student in operating such facilities. (4) As managerial ability is always a most scarce factor, fewer institutional managers will be required and the best managers can be utilized.

Recommendation No. 60 : To design a consolidated system, short term-facilities utilization/educational planner consultant(s) should be found to support the Manpower Division in its detailed analysis and development of a practical plan. It is strongly recommended that there be no further proliferation of the MATI system until all have reached the minimum size.

Recommendation No. 61 : Division staff at all levels should strive diligently to employ democratic processes such as thoroughly involving staff members throughout the system in planning and policy setting. This approach will maximize the soundness of decisions, gain support in implementation, and create an atmosphere of mutual respect and harmony. Once decisions are made through democratic processes, supervisors can and should insist that they be more carefully followed.

The Division's Annual Training Conference is a prime example of useful involvement. It should continue to be used, and even expanded, as a forum for dialogue and for recommending changes in the system. Permanent committees of principals and coordinators of studies are recommended to make the conference more productive.

* 30 percent of all tutors surveyed said they were teaching topics for which they were not prepared.

Recommendation No. 62 : Both at headquarters and at MATI level, it is very important to conduct six to twelve staff meetings per year to maintain momentum and direction in program activities. It is equally important to maintain active permanent committees, particularly in the MATIs. The Divisional staff might be able to support MATIs better if a professional training committee, a facilities utilization committeee, and others were appointed.

Recommendation No. 63 : A better scheme needs to be devised for rewarding superior work. The best is for salaries and promotions to accurately reflect performance ratings. Care should be exercised, however, not to give better workers crushing work loads while rewarding the lazy with lighter assignments. Full effort must naturally be demanded of all.

Recommendation No. 64 : At every level, adminstrators should be indoctrinated with the concept that program success depends on good supervision and that supervision includes training one's subordinates. Although the survey did not measure them, too many staff members at the MATIs appear to be unproductive and even unconscientious. This tends to support the need for more vigorous supervision, although the situation needs to be studied more closely to see what the contributing factors are. Each staff member should develop with his/her supervisor monthly or quarterly plans of work with specific, measurable objectives and specific activities, and then be continuously checked for progress against the objectives.

b. Financial Resources and Planning

Several principals reported that quarterly releases of recurrent or operating funds are less than the originally allocated amounts. Funds actually received by MATIs are grievously short of the level needed to conduct consistently high quality education. In 1978-79, an average of Shs. 8000 per student was allocated to MATIs but

less than this was released. Some Divisional staff felt that about Shs. 13,000 per student would be an ideal rate of allocation. Another problem faced by MATIs is that of varying enrollment. The MATIs could function with less stress if a planned and consistent number of students were allocated each year. Lastly, there is at present no proper separation of headquarters emoluments costs from individual MATI budgets.

Recommendation No. 65 : Given the present insufficiencies of funds for essential commodities and services, no expansion of student numbers or of MATIs should be undertaken until the present shortages of funds have been remedied.

Recommendation No. 66 : A closer relationship should be established between (1) the volume of students, the diversity of their work programs, and the special projects and activities of each MATI, and (2) the allocation of funds to each. The Division is acting on this problem now.

Recommendation No. 67 : Unit costing should be instituted for food, accommodations, subject matter teaching (lab courses vs. others), library and other recurrent inputs on a per student basis. With such unit costing, it would be possible to easily compile estimates that divide funds equitably and permit proper controls.

Budget estimates compiled from unit costs will assist with the rational defense of costs and will allow principals to decide where to cut expenditures when required without damaging the most essential parts of their programs. Budget requests should continue to be presented to the Treasury on the basis of cost per student times the number of students. A study of the cost factors per student should be done; a management specialist in financial systems for educational institutions should be secured to help design an improved overall system.

Recommendation No. 68 : MATIs should be consolidated or expanded to a minimum of 320 students each as rapidly as possible.

Large schools can operate more cheaply, primarily because of greater labor efficiency.

For example, a small piggery or library to be used by forty students requires almost as much manpower to operate as does a larger facility for 300 students. Administrative overhead is very costly in a small school.

Three MATIs which enrolled 200 or more students in 1978-79 (excluding MATI Uyole, a parastatal) had an average per student allocation of Sh. 6,676 -- as shown in Exhibit IX-C -- whereas the three MATIs which enrolled fewer than 100 students had an average per student allocation of Sh. 12,602 --almost twice as much.

Recommendation No. 69: MATI principals should be given a short course in management as it applies to MATIs with emphasis on fiscal control.

Recommendation No. 70: Efforts should be made to provide MATIs with a fixed and quarterly allotment of funds.

Recommendation No. 71: The following additional well-known ways to reduce costs of operation at MATIs are recommended:

(1). Share or exchange more facilities or equipment with the associated Research Institute or other organizations.

(2). Reduce the number of staff wherever possible and require more productivity from the remaining ones. One person might be able to manage several, rather than a single, grazing paddock, for example.

(3). Be realistic in calculating costs of self-reliance and production projects and manage accordingly. Typically these projects are large money-losers if all hidden costs are realistically calculated and added.

(4). Tutors and students will benefit in experience by doing more of the farm work which offers potential for learning. This does not mean that students spend more time hoeing or doing other purely routine work.

(5). Simplify policies, processes, and procdures at every opportunity. A case has already been made for simplifying the final exmaination procedures.

(6). Purchase supplies further in advance according to annual and long-range plans. Driving 45 miles to get more mimeograph paper for examinations may make the

Exhibit IX-C: MATI System Students, Staff, and Cost Data, 1978-1979

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
MATI	Location	Total Student Enrollments During 1978-79 School Year	Student Capacities*	Staff Strengths June 30, 1979 (Establishment)	Students Per Tutor	MATI Allocations for 1978-79 in Millions of T. Shs.	Per Student Costs Based on 1978-79 Allocations in T. Shillings**
Uyole	Mbeya	361	268	63	5.7	-***	-
Nyegezi	Mwanza	249	307	42	5.9	1.8	7229
Tengeru	Arusha	244	320	57	4.3	2	8196
Ukirguru	Mwanza	226	346	42	5.4	1	4425
Mpwapwa	Mpwapwa	169	137	35	4.8	1.2	7101
Ilonga	Kilosa	117	134	50	2.3	1.2	10256
Tumbi	Tabora	117	78	24	4.9	.8	6837
Mtwara	Mtwara	115	74	24	4.8	1	8696
Maruku	Bukoba	114	62	26	4.4	1	8772
Morogoro	Morogoro	38+45=83****	102	21	3.9	.718	8651
Mlingano	Tanga	62	53	33	1.9	1	16129
C.V.L. Temeke	Dar es Salaam	31	63	2	-*****	.5	16129
TOTAL		1885 (w/o Uyole1524)	1944	420	Av. 4.5	12.218	Av. 8017

* Data provided by the Division of Manpower Development, based upon the capacity of the most limited facility, usually hostels where $5m^2$ floorspace was deemed adequate per student.

**Actual funding generally fell short of allocations. Col. (7) =Col. (6) ÷ Col. (2).

***Comparative figures are not presented due to the MATI's status as a parastatal for 3 MATIs.

**** MATI Morogoro retrained 135 field staff during the school year equivalent to 45 regular students per full year.

*****As researchers at C.V.L. Temeke assist in teaching, the ratio is unknown.

paper cost Shs. 200/= per ream, for example.

(7). Cut out all non-essential costs, such as travel to the graduation ceremonies at other MATIs.

(8). Train the accounts staff and maintain fiscal accounting of all operations as a management tool.

(9). Involve department heads in both budget estimates and in later readjustments made necessary by funding shortfalls. This helps to ensure maximum effective allocation of the monetary resources and keeps the staff involved in important decisions.

(10). Schedule the use of MATI facilities for maximum utilization. Some laboratories, for example, stand unused much of the time because most MATIs do not rotate student groups between theory and practical classes each a.m. and p.m.

(11). MATI staff can sometimes manage the construction of new buildings, thereby saving up to 50 percent of the cost of contracting the construction. Care must be taken, however, not to tie up staff and transport resources at busy times, or to take on construction activities beyond the real capacities of the staff.

c. Physical Resources and Planning

(i). General

There are wide variations in the facilities and equipment presently available at the various MATIs, even on a per student basis. During the survey of the MATIs, shortages of facilities, equipment, and supplies were indicated by adminstrators, staff, and students as a constraint to quality education more often than any other factor.

The major conclusions drawn are (1) that funds are chronically scarce, and (2) that too many MATIs are too small to operate efficiently. Large MATIs are or can

be more efficient than small ones in all respects. If the small MATIs merged with others, the combined equipment and facilities would be better utilized and more plentiful. This is especially true of equipment or facilities that are used only rarely, such as surveying instruments.

Future construction must be planned very carefully and deliberately as part of a Division master plan for Certificate and Diploma training. Sites must naturally consider the types of courses to be offered, the teaching methods, the levels, the numbers of student streams, present facilities, and the need to build in multi-purpose flexibility wherever possible. Some suggested per student measures of facilities, equipment, and materials have been compiled in Exhibit IX-D. These should naturally be examined by the educational facilities planner recommended earlier, in consultation with a Divisional physical resources committee.

Exhibit IX-D

MATI Capital Investment Costs Per Student
for Physical Facilities, Major Equipment, and Materials

Item	Units Recommended Per Student (or Tutor)	Cost Per Unit	Cost Per Student (or Tutor)
Classroom space	1.5 m^2	1500/=	2250/=
Dining room and kitchen space	1 m^2	1500/=	1500/=
Laboratory space	1 m^2	2000/=	2000/=
Hostel space	5 m^2	2000/=	10000/=
Tutor houses (Grade A)	107 m^2	2500/=	267500/=
Tutor houses (Junior grade)	80 m^2	2500/=	200000/=
Adminstration block, offices, staff room	1.5 m^2	2000/=	3000/=
Library building	.5 m^2	1500/=	750/=
Library books	n/a	n/a	1000/=
Dairy, poultry, piggery buildings	n/a	n/a	1700/=
Other farm buildings: grain storage, shops, other stores	.3 m^2	1000/=	300/=
	.5 m^2	1500/=	750/=
Land	1 ha.	n/a	n/a
Livestock	n/a	n/a	n/a

Exhibit IX-D (Continued)

Item	Units Recommended Per Student	Cost Per Unit	Cost Per Student
Furniture for houses, offices dormitories	n/a	n/a	2400/= (est.)
Sanitary buildings	0.16	2000/=	320/=
Other equipment, materials	n/a	n/a	2500/= (est.)
Transport	n/a	n/a	2000/= (est.)
Farm power machinery	n/a	n/a	4300/=

Source: Manpower Development Division, Ministry of Agriculture

Initial expansion must be planned to utilize much of the present excess capacity of institutes noted in the chapter on supply (Chapter IV). Classroom capacity at several of the MATIs greatly exceeds hostel capacity, for example.

Recommendation No. 72 : Ways to improve utilization of present facilities as well as the best design for future buildings should be explored by the physical facilities committee from Division headquarters, along with the planning consultants. The major means of increasing building and equipment utilization is obtained by having half of the students involved in practicals in the a.m. and half in the p.m. thereby doubling the use of laboratories, shop, farm, and farm equipment. Increases in the use of classrooms are also possible since some classrooms are used for the conduct of practicals.

Recommendation No. 73 : A normal part of the Division's supervision of MATIs should be an assessment of efficiency in facilities utilization.

Recommendation No. 74 : Many simple pieces of equipment could and should be fabricated at the MATIs, such as insect collecting nets, plant presses, seed treatment devices, and gobar gas plants. At Mpwapwa, for example, microscope lights wer made from coffee cans, wood, and electric light receptacles.

(1. MATI Libraries

The libraries visited did not generally indicate the degree of vitality or the quality of collections one would like to see.* They seemed to be especially weak in terms of procurement of locally available reports. The generally poorly-trained staffs apparently view their roles primarily as caretakers of books.

Recommendation No. 75 : If it has not already been done, each MATI principal should appoint an interested, able staff member to be chairman of an active library committee. The cahirman and his committee should take responsibility to train library staff members where needed, vigorously identify and procure reference materials (especially those available in Tanzania), and keep the library open during the evening hours.

Recommendation No. 76 : It is strongly recommended that MATIs and Research Institutes share a common library wherever they coexist at a site. Important, single copies of research documents can be maintained in an archives section of the library to guarantee their safety.

Recommendation No. 77 : Headquarters staff should assist MATIs in obtaining local documents by pressing other divisions, parastatals, etc. to disseminate useful reports, leaflets, and other materials and by actively locating additional donors for library reference materials.

Recommendation No. 78 : On a broader scale, the study team supports the recommendations made at the Agricultural and Livestock Research Workshop, Arusha, Feb. 26 - March 3, 1979** to establish a National Agricultural Library system, with the Faculty of Agriculture, Morogoro, serving as the National Agricultural Library. The National Library would also service the Research and Training Institutes in the nation. It would provide photocopies, loan books, order and catalog books for the entire system, and advise satellite libraries.

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* See responses by MATI principals and coordinators of study in Appnedix and Q.4, under the Physical Facilities and Transport subheading.
**See the Report of the Committee on Documentation and Library Service.

d. Staff Resources

There were 420 tutors assigned to the twelve MATIs in the country in May, 1979, 30 of whom were expatriates. At the same time, there were about ten professional-level staff at headquarters. Of the Tanzanian tutors, four percent held M.Sc. or Ph.D. degrees, 22 percent held B.Sc. degrees, 41 percent held Diploma degrees, and 33 percent held Certificate degrees.

The major problems with regard to MATI staff relate to the following situations: (1) few have had any teacher training*; (2) teaching is often seen as a low status, boring, difficult, and temporary job**; (3) about half of the tutors surveyed apparently had not served in positions other than teaching where they could improve their practical skills and better understand the situations students will face upon graduation; (4) 30 percent of the 167 tutors surveyed said they are teaching topics they are not prepared for; and (5) many administrators, tutors, and students feel the tutors need further subject matter training.***

The need for additional professional training and more practical experience among tutors has already been discussed in the earlier sections dealing with improved theory and practical instruction.

(1). Selection and Retention of Tutors

Recommendation No. 79: The practice of MATIs identifying some of their graduating Diploma students as potential MATI tutors and recommending them to the Director of Manpower Development should be expanded and formalized to guarantee deliberate selection by a competent committee of tutors. Selection should be based on such criteria as the following: academic competence, appropriate field experience, expressed interest in teaching, self-confidence, and ability to organize and express ideas. A MATI

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* In a sample of 167 tutors, 19 percent said they had had a three-week "methods" short course and a handful had B.Sc. degrees in Agricultural Education.

** In the sample of 167 tutors, 41 percent said they would prefer other duties and 27 percent said they liked teaching "not very much" or "not at all."

*** When asked how well their tutors knew their subjects, 28 percent of 967 students responded:"few know them very well."

Exhibit IX-E

Staff Disposition in the MATIs as of May 1, 1979

MATI	CERTIF. HOLDERS	DIPLOMA HOLDERS	B. SC. HOLDERS	M. SC. HOLDERS	PH. D. HOLDERS	EXPATRIATES	TOTALS
MATI UYOLE	16	29	13	1	-	4	63
MATI UKIRIGURU	13	15	10	1	1	2	42
MATI TENGERU	13	27	8	4	-	5	57
MATI MPWAPWA	8	14	7	2	-	4	35
MATI NYEGEZI	8	16	9	1	-	8	42
MATI MTWARA	7	9	7	1	-	-	24
MATI MLINGANO	8	10	9	2	-	4	33
MATI ILONGA	23	18	6	1	-	2	50
MATI MOROGORO	10	6	4	1	-	-	21
MATI TUMBI	10	8	5	1	-	-	24
MATI MARUKU	14	6	5	1	-	-	26
CVL TEMEKE	-	2	-	-	-	-	2
TOTALS	130	158	85	16	1	30	420

committee should interview all potential nominees before recommending them to DMD.

Recommendation No. 80 Some new staff still enter directly from university coursework or from field assignments. The study team would prefer that these potential tutors from sources outside of MATIs be screened through interviews. Selection of trainers is no less crucial than Diploma student selection. Selection committees should look for people who will be able and willing to make teaching a lifetime profession and who will be worth the investment in time and expense required to professionalize them.

Recommendation No. 81 : To rectify the problem of tutors often having too little practical or field experience, it is recommended that appropriate experience become prerequisite to the placement of new staff in teaching roles, or, where exceptions are made, that appropriate in-service field assignemnt of 2 - 6 months duration be substituted.

Recommendation No. 82 : MATI principals should continue to be surveyed regularly to see what kind of staff members are needed and which ones might best be transferred to another MATI or another agency.

Those tutors who are not at all happy in their teaching assignment could be given transfers as soon as possible, preferably in exchange for another person. Major unhappiness with work assignments is nearly always accompanied by poor performance.

Recommendation No. 83 : It is recommended that staff members generally not be rotated to another teaching station in less than two years. However, individuals should not be required to stay extremely long periods in just one institute either. Some rotation adds to the experience base and may reduce the monotony and boredom which seemed apparent in the survey.

Recommendation No. 84 : It is recommended that more incentives or rewards be provided for good instruction to counter the apparent low motivation of a sizeable percentage of tutors. Good performance should be recognized by letters of appreciation from superiors, by announcing innovative activities, by newsletter notice, by tutor's day awards, by opportunities to advise administrators, and routinely by compliments and

thanks. Divisional staff and MATI administrators should constantly indoctrinate tutors regarding the importance of teaching.

(ii). Tutor Training

In the past, the Manpower Development Division has been assisted by the British Council in conducting teacher training short courses of three weeks' length for about three tutors per MATI per year. This year, 10 tutors will attend a 10-week course in Great Britain. This is a very commendable exercise as most tutors regard themselves professionally as livestock or agricultural scientists and not educators. Teachers, however, do not necessarily embrace better teaching techniques merely because they have been briefly exposed to them. It is said that theory does not always dictate practice. For professional improvement of MATI tutors, two essential elements of the change process are crucial. First, there must be a substantial effort to enhance the involvement of tutors, and to shift their perceptions, their attitudes, and their senses of motivation with respect to teaching. Second, a consistent and efficacious program of guidance and support must be provided as tutors attempt to put their new value systems and methods into practice. This could be achieved through a special reorientation program for all tutors.

The kinds of training needed by various Divisional staff include academic or subject training, the training which comes from practical work experience, and professional or pedagogical training.

Recommendation No.85 : Adequate subject knowledge is the first prerequisite for teaching. The upgrading of staff to the Diploma degree for Certificate Course teaching, and to the B.Sc. degree level for Diploma Course teaching, should continue as rapidly as possible.

Those tutors who are inadequately prepared to teach in at least one minor specialty area, and who have no immediate opportunity for degree training, should attend appropriate short courses.

Recommendation No. 86 : Tutors of Diploma students and selected others who have never had field experience pertinent to the major topic areas they teach, are recommended to be posted to appropriate work assignments for two to six months to gain practical experience and confidence. Thus, a farm management tutor might be assigned to assist a farm manager in one of the parastatals. Each MATI administration should identify such needs amongst the staff and propose a schedule of posting to DMD -- perhaps at the rate of two to four tutors per year.

Most tutors of the general Certificate course, it is recommended, should substitute intensive village activity by MATI staff and students for these work assignments.

Tutors also need to involve themselves more in the farming projects undertaken at every MATI, to benefit from the practical experience.

Other tutors might be enrolled in short courses at the Continuing Education Center at Morogoro or elsewhere, which could be designed to upgrade specific practical skills.

Recommendation No. 87 : Professional training or pedagogical training of three types is recommended. They are : (1) annual short courses offered at each MATI, (2) teacher training leading to a Diploma degree in Agricultural Education, and (3) short courses to upgrade the teaching of specific practicals, probably at the Continuing Education Center in Morogoro.

Recommendation No. 88 : To begin the long process of reorienting tutor attitudes and teaching habits, it is recommended that a team of experts prepare and conduct an intense teaching methodology short course of two weeks' duration for all staff in the MATI system, one MATI at a time, until all MATIs have been exposed to the courses. By involving the entire staff of a MATI, lasting changes are more likely to occur from training than where one or two staff members are trained at a distant site and returned to an unsympathetic environment. As a final act, supervisors (administrators) at every level should join with short course instructors and tutors in setting specific goals for change. Constant follow-up by supervisors would then be needed to ensure that they are reached.

Recommendation No. 89 : The Ministry of Agriculture should cooperate with the Ministry of National Education to jointly establish and utilize a diploma college of agricultural education. The Ministry of National Education has already started working on this project. Cooperation between the two Ministries in this matter would save a lot of unnecessary duplication of efforts. After the establishment of the college, all new MATI tutors should be required to obtain a diploma in agricultural education in addition to qualification in a subject area. A teaching salary increment should then be provided.

Teacher preparation training which stresses practice teaching and critique of practices for bothe theory and practicals should add immeasurably to the tutors' creativity and skill in teaching. It should drastically improve their self-images and add vigor and enthusiasm to their teaching. In brief, it should professionalize them.

The secondary school agricultural tutors who had obtained such degrees seemed to be better motivated and more content in their roles than were MATI tutors visited during the survey.

Recommendation No. 90 : In continuing with the task of professionalizing MATI tutors, the Ministry of Agriculture should utilize the facilities to be provided by the Center for Continuing Education at the Faculty of Agriculture, Forestry, and Veterinary Science, Morogoro, to conduct seminars and short courses for tutors, especially to teach practical skills in various topic areas and how to teach them well.

Recommendation No. 91 : It is recommended that the Ministry of Agriculture through the Manpower Development Division cooperate more closely with the Ministry of National Education and the Institute of Education in the areas of tutor training and curriculum improvement.

Recommendation No. 92 : A staff development record or form should be constructed and used at all MATIs. The record should show the present areas of expertise, short courses previously attended, the future training needs of each tutor, and when the tutor

could next be released. The future needs should be determined in consultation with tutors. The form(s) would serve as a planning document and progress report.

Recommendation No. 93: It is recommended that an agricultural teachers' association be formed, dedicated to the professional improvement of tutors and designed to improve communication between field and headquarters staff. Such an association might issue a quarterly professional publication which would make an excellent forum for exchange of ideas.

Such an organization would not duplicate the present National Council on Agricultural Education.

Recommendation No. 94: The Manpower Development Division should soon organize a five to sevenday workshop for all coordinators of study and deputy principals throughout the system. Their roles as helper, motivator, and supervisor of academic programs and staff are vital to the quality of education at the MATIs. The workshop should help them gain new insights. It should allow for the sharing of successes and problems; it should provide experts to help individuals identify new alternatives and ways of improving academic program operations. In connection with this, headquarters representatives should participate in working out differences in expectations and in policy and goal setting.

Recommendation No. 95: Headquarters staff, MATI principals, and MATI deputy principals could benefit from short courses in public administration, management of public institutions, and planning of educational activities.

(iii) Student:Tutor Ratios and Teaching Loads

The student:tutor ratios found in the survey of MATIs ranged from 1.9:1 at MATI Mlingano to 5.9:1 at MATI Nyegezi, and averaged 4.5:1 for the entire system. The average ratio is based on a total staff count of 420 persons (including some sub-technical staff), and 1,885 students. In fact, the survey revealed that about 24%, or 101 of the total staff

who were assigned to MATIs were on study leave, in national service, on maternity leave, or on other extended leave.

Thus, the ratio of students to active tutors (based on the survey sample of 8 institutes) was 5.9:1.

The study team concurs with the present divisional objective of a 20 contact hour teaching load per tutor per week. In a MATI of 320 students, using recommended streams of 40 students (estimating practical groups of 20 half the time, and 10 the other half) 32 tutors would be needed to teach the 640 weekly contact hours. This would imply a ratio of 10:1. However, in a MATI of 320 students, about 8 staff, or 20% are estimated to be utilized in major non-teaching roles (principal, farm managers, etc.). Thus,32 plus 8 or 40 on-site tutors are actually required for 320 students, yielding a ratio of 8:1. If the 24% of tutors on long leaves and national service were to be properly compensated for, then the number of tutors shown on a normal roster would have to rise by 10 to 50 tutors for 320 students, or a ratio of 6.45:1.

Recommendation No. 96: It is recommended that ralistic managerial measures of efficiency and equitable workload distribution be evolved for each of the major institutional functions and activities at a MATI. The instructional, administrative support, self-reliance production, and others should be categorized, and the numbers of person years required for each. The numbers of person years required will vary due to level and complexity of subject matter taught, the sizeof facilities, land potential, existing operations, numbers of courses taught, amount of village outreach activities, and so forth. It has already been mentioned that a minimum of 20 contact hours per week appears to be appropriate for an individual full time tutor, who also carries some normal extracurricular duties.

It will be noted that at the 6.45:1 ratio mentioned above, the 420 tutors already in the MATI system could teach 2,604 students rather than the present 1,885. A key factor is that the recommended ratio of 6.45:1 students to tutors-on-roster, is based on an assumption of larger and more uniform institutions than are now existing.

e. Student Resources and Planning

As the supply analysis in Chapter IV has demonstrated, the budget constraint is not the one which will most limit future outputs of MATI-trained manpower. Rather, it is the availability of Form IV intakes from the higher quality levels. In recent years past, MATI certificate programs were receiving category D and E allocations. The dropout rate among course students in 1976 throughout the MATI system was a high 25.9 percent. In the 1979-80 intakes, categories B and C personenl were assigned. This should significantly reduce the drop-out rate. Overall MATI throughput efficiency will thus be improved as well as the quality of personnel received by end users. To meet the needs of the agricultural sector, and especially the expanded applied action-research/ extension operations advocated in the utilization section, the allocation of higher quality personnel needs to be continued.

Administrators and tutors surveyed quite often identified student selection or student ability as problem areas. Several administrators said the Certificate students are very weak in mathematics, science, and English. However, only 17 percent of the 156 tutors surveyed during the study rated Certificate students as poor or very poor academically.* On a 5-point scale, 46 percent rated the students as "fair" academically, the midpoint of the scale.

The Ministry of Agriculture's expressed policy is to select students with agriculture-biased secondary school backgrounds for Certificate training, although the survey accompanying this study found that only 62 percent of the student sample had come from such schools.

Many principals and tutors reported that Diploma courses seem to have drawn so heavily from the pool of Certificate field staff as to have rather depleted it of qualified people at this time. Although abilities and backgrounds vary widely, the overall ability-level of entering Diploma students seems to be

*See Q. 10 of tutor questionnaire results in the Appendix.

declining, in some courses markedly so. (See the appendices summarizing responses to the interviews.)

Recommendation No. 97 : As recommended at the Division's 1978 National Agricultural Training Conference, the MATIs should send recruitment teams to the nearby agriculture-biased secondary schools every year, near graduation, to encourage more good students to choose agriculture for Certificate training.

Recommendation No. 98 : In the long run, improved education and increased output at the secondary schools will have a very great impact on MATI training. Therefore, the Minstry of Agriculture should support and assist the Ministry of National Education in its efforts to upgrade secondary school education.

Recommendation No. 99 : Parastatals should not be allowed to place students in MATIs if they have not satisfactorily completed secondary school.

Recommendation No. 100: At the Diploma level, it is recommended that candidates with weak credientials be rejected even if intake quotas are not met. The selection committees need to have final authority in making selections, assuming headquarters staff participate in the exercise.

Recommendation No. 101: When recruiting, it is recommended that the Division search for better ways to differentiate between Diploma candidates who are truly interested in the course speciality and those who aren't. They should not be nominated because they are "next in line."

Recommendation No. 102: To reduce the problems coming from student variability in each institute's entering classes, it is recommended that the Minstry consider grouping trainees by backgrounds. For example, separate streams for Form VI entrants as constrasted with experienced Certificate staff, may facilitate learning efficiency inat least the first year of studies.

Recommendation No. 103: Students should not be enrolled late into a MATI by more than three weeks.

f. Coordinative Structures

Headquarters staff of the Division of Manpower Development seem to be making an effort to coordinate with other educational units, relevant ministries, etc., though staff shortages impede the effort.

In the survey of 167 MATI tutors, approximately half reported having contacted agricultural officers and half reported having contacted researchers during the past year (an average of five and four times, respectively). About one-fourth of them reported having contacted each of the following groups: persons having Tanzanian printed matter, village managers or Bwana Shambas, and others. The many remaining tutors would seem to be very inactive in outreach aimed at updating themselves professionally. This appears to be a major weakness of staff in general. The teaching notes observed during the study generally incorporated very little information regarding the Tanzanian agricultural situation.

Recommendation No.104: Division supervisors, principals, coordinators of study, and department heads should insist on tutors maintaining adequate linkages to research, to Kilimo field staff, and to farmers. Events should be organized with specific objectives set for such linkages or contacts to occur. Students should often be included in contacts with surrounding agriculturists. Increased use of villages as training laboratories and increased participation with researchers via joint village activities will automatically tend to solve this present problem of tutor isolation.

Recommendation No. : The Division of Manpower Development, MOA, must actively coordinate with the Ministry of National Education's Secondary and Teacher Division, the Minstry of Manpower Development, the Ujamaa Cooperative Development Division of the Prime Minister's Office, the Crops and Livestocks Divisions of the MOA, the Research Centers, parastatals, regional development

projects, and others, to ensure its proper direction and to enlist the cooperation and support of these units.

C. The Faculty of Agriculture, Forestry, and Veterinary Science: A Summary

The full report on the Faculty of Agriculture, Forestry, and Veterinary Science at Morogoro can be found in Appendix A-IX.

1. Programs

a. Curriculm Development

The consulting team applauds the current discussions being conducted by the Faculty on the following issues: (1) the amount of practical training that can be offered, (2) relationship of training to self-reliance activities, (3) length of time required by different intake qualities to obtain degrees, (4) syllabus revision necessary to be fully relevant to Tanzanian agriculture and to avoid duplication and overlap, and (5) timing of introduction of specializations.

A careful study of all possible alternatives should continue to be made. Consultation with colleagues from other university faculties of agriculture may be useful in the sorting-out process. The consultants have the feeling that the degree program may need lengthening because of the worthy multiple objectives to be achieved. It may also be necessary to consider whether or not a full year should be devoted to practical work. Student involvement in these discussions would be useful.

(i). Continuing Education Center

This program is vitally needed to give practical support to the field workers in agriculture.

(ii). Program Expansion

Degree programs in range management and wildlife studies should be

considered for the future. They are naturally of importance to Tanzania. Possible donors should be sought to avoid affecting the growth of activities in other departments. An agricultural engineering program is also recommended.

b. Teaching Materials and Methods

The Department of Agricultural Education and Extension should be asked to provide in-service training for staff. They could upgrade the efficiency and effectivness of instructional staff with presentations on the use of audio-visuals, the preparation of lesson plans, and other aspects of teaching.

2. Management

a. Facilities

The major priority is to provide for additional staff housing. Staff will be returning from advanced study in the coming years and the situation could be very difficult.

The library holdings need to be significantly increased. The five-year plan request should be implemented, including library service staff training. Efforts should be made to secure contributions of more books, journals, and teaching and research materials. Linkages with other universities might be explored.

Additional operating funds are essential for student field trips, for equipment to oeprate the farm and to teach in classrooms, laboratories and the field.

Additional sports facilities are needed for both students and staff. Students should take a major role in the planning of possible facilities and programs.

b. Student Resources

Student enrollment is now considerably less than the capacity of the facilities and staff because qualified students are in short supply.

Donors should consider giving funds to support students at the Faculty rather than overseas. Large numbers of students should not normally be sent overseas for training that is available in Tanzania, with sufficient places and operating funds at the Morogoro campus. Specialized disciplines not available at the Faculty at Morogoro are, of course, exceptions.

c. Staff Resources

Staff continuity should be enhanced by: (1) finding ways to attract and hold the required staff for longer periods of time. Turnoyer is too high at the moment; and (2) Tanzanian faculty members should be receiving at least equal income and fringe benefits as other agricultural personnel with similar qualifications serving in the Ministry and elsewhere in the sector.

d. Coordination

Communication and cooperation between the Minstry of Agriculture and Faculty concerning manpower planning issues should be enhanced. The assigned specific liaison personnel should meet at regular intervals througout the year to review the evolving situation. Top management of the Faculty and Ministry should be kept informed by these liaison personnel.

D. Foreign Training of Agricultural Manpower

A great number of Tanzanians go abroad for short courses in various fields of specialization. Records show that at least 185 Tanzanians attended short courses in various agricultural fields in various countries between 1976 and 1979. Many others are thought to have studied abroad without being

being registered in Kilimo records.

While it is evident that there are many benefits derived from sending people abroad for short courses, to donor as well as recipient, the high costs of air travel and the gross differences in agricultural settings make their value questionable. Such courses, if well organized and well planned, would often be more relevant if conducted in Tanzania. They would be cheaper and more people could attend. For similar reasons, graduate and post-graduate courses that can be or are being offered at the Faculty of Agriculture, Forestry, and Veterinary Science at Morogoro should be taken there rather than overseas.

It is recommended that the proper Tanzanian authorities forcefully request donors of scholarships to follow the precedent already set by sponsoring in-country training whenever such training seems to be advantageous.

E. Agricultural Education in Secondary Schools

1. Introduction

The introduction of agricultural education in secondary schools is part of a vocational program started in 1971 as a deliberate attempt to implement education for self-reliance. Through this policy, students are expected to learn as they produce and to produce as they learn. The aim of this program is to help students to recognize and understand theproblems of the rural population and to train to them to assist in the development of the rural sector, rather than adopting superior attitudes which are contrary to the country's principles of building a socialistic and egalitarian society.

After completion of his/her secondary education, an agricultural secondary school graduate may be selected for further studies related to agriculture by enrolling in one of the Ministry of Agriculture's Training Institutes or by going on to Form V of secondary school and later joining the Faculty of Agriculture. Others may enter fields such as teaching or medicine. Some go back to their villages to become self-employed in agriculture.

In April, 1979, there were 40 agricultural-biased secondary schools in the coun ry with 422 streams of 35 students between Form I and Form IV. This makes a total of 14,770 students. Plans are underway to introduce agriculture as a subject at Forms V and VI levels in the near future. The subject falls under the same combination as biology and chemistry. A draft syllabus for this combination has been completed and circulated to various authorities for comments.

Thirteen periods of agriculture are recommended per week, only three in Theory, but schools vary in their scheduling. About 48-52 periods per week are commonly scheduled , excluding self-reliance activities.

In 1975, 1,952 students in eighteen agricultural-biased secondary schools attempted the national Form IV examination in agriculture for the first time. At the end of 1979, 3,814 students in 40 such schools will attempt a similar examination. This shows an increase of 93 percent over a three-year period. Exhibit IX-F shows the provisional placement of students made during the first two years in which agricultural-biased Form IV students graduated. It can be seen that the percent of agriculture-trained students placed in MATIs is small.

Exhibit IX- F

Provisional Placement of Students
from Agricultural-Biased Secondary Schools,1975-1976

Placement of Output	1975		1976	
	No.	Percent	No.	Percent
MATIs	216	11.0	225	7.0
Teaching	706	36.0	1513	47.7
Form V	487	25.0	803	25.0
Natural Resources	20	1.0	11	0.3
Areas unrelated to agriculture	248	12.7	343	11.0
Back to villages	275	14.0	266	9.0
Total	1952	100.0	3161	100.0

Each year since 1972, about 30 Certificate holders from MATIs have been recruited for teaching agricultural topics in secondary schools and given methodology training for nine months by the Ministry of Education. The staffing goal of the Ministry is to upgrade tutors to a ratio of 1 B.Sc.:2 Diplomates: 4 Certificate holders.

2. Some Observations from School Visitations

The survey team briefly toured four agricultural-based secondary schools, primarily to better evaluate the backgrounds of MATI students coming primarily from these schools. Visited were: Iyunga Secondary School, Mbeya; Kilosa Secondary School, Kilosa; Mzumbe Secondary School, Morogoro; and Kibaha Secondary School in Kibaha. Two visits were also made to the section of the National Ministry of Education which supervises agriculture programs in secondary schools.

a. Kilosa Secondary School

Kilosa, a co-educational agricultural secondary school started in 1976, is embarked on a special pilot program combining education and work. Students and tutors at this school are in two groups which rotate between morning and afternoon activities. When group A is engaged in the classroom (seven 45-minute sessionsof classes), group B is doing three hours of work education on the school farm and vice versa. The school has 512 students and 26 tutors; it has 112 ha. of land on which maize, sorghum, beans, bananas, fruits, and vegetables are cultivated. It also has a poultry unit of 500 layers and a broiler capacity of another 500 birds and a modest dairy unit with six milking cows, a bull, and eight calves and a small piggery with two pigs.

This pilot school seemed to contrast rather sharply with the other schools visited in respect to the management of the self-reliance activities; work

efficiency and productivity seemed to be outstanding. Fifty hectares of beans and six hectares of bananas, along with the maize, makes the school quite self-sufficient in food. The apparently aggressive and efficient work habits being taught are in themselves a most important aspect of education for national agricultural development.

Agriculture as a subject has the same status as other subjects. For practical experiences in agronomy, each student has a ridge of vegetables (six meters by one meter) to manage in his/her own spare time. They are assessed on the quality or work they do on their own ridges. The self-reliance enterprises are sometimes used by the agricultural teacher for demonstrations and other instructional purposes.

The student body is divided into 12 streams of about 40 students each. Tests were said to be conducted weekly, monthly, at midterms, at the end of terms and at end of year. Approximately half of the test items were said to be of the objective type. All lesson plans were inspected for adequacy.

b. Iyunga Secondary School

This school has a total enrollment of 700 students. It started its agriculture-biased program in 1974. Although it is now introducing an industrial-arts bias, the agricultural bias will still remain. It has an agricultural facility which was built with IDA/World Bank aid, and comprises a workshop, a classroom, an office, and a store room. The school had five hard-working agricultural teachers who, despite the shortages of teaching materials such as textbooks, visual aids, a tractor, and farm implements, try to make the best use of what the school has available. This year they planted ten ha. of maize and two of horticultural crops. The school had a dairy unit of 11 milking cows, a piggery with five mature pigs, and a poultry unit with 371 layers. While the latter has a 1500 bird capacity, it was said to suffer from an inadequacy of chicks and quality feed.

The agricultural training offered students consisted of three periods of Theory per week, two and one-third hours of field work per week, and a very small amount of early morning and evening practicals at the livestock enterprises. Groups of five boys were said to spend one week at each livestock enterprise, caring for the animals. If 140 groups rotate among three animal units, it is obvious that students are only barely introduced tc livestock management and that early morning practicals conducted at MATIs are not an unnecessary duplication of this secondary school training.

c. Mzumbe Secondary School

This school has 540 students. Of these, 400 are participating in the agriculture-biased program. The school has been doing fairly well in the national Form IV exams as far as agriculture is concerned.

The school has an agricultural facility built with assistance from NORAD. The unit is composed of a workshop, a classroom, an office, and a store room. Agricultural projects in the school include a piggery with 40 pigs, a dairy unit with 14 milking cows and a calf, and a poultry unit with 76 birds. The school is now growing70 hectares of maize, 10 hectares of tobacco, and a small orchard.

The agricultural tutor visited said that some agricultural topics cannot be taught due to shortages of time, text books, teaching materials, and farm implements. The school is unable to utilize its newly-acquired tractors because it has no farm implements. The study team noted that the carpentry tools and some mechanics workshop equipment had not been used.

Shamba work was said to be conducted for 1-3/4 hours three days per week.

c. Kibaha Secondary School

This school has two biases, agriculture and commerce. Out of 672 total

total students, 320 are participating in the agricultural-bias program. There are four agricultural tutors. The performance of these ag-biased students in the national Form IV exams was described as good.

The school has an agricultural facility with a workshop, a classroom and office, and a store room. For practicals, students have small plots of maize and ridges of vegetables. The school has a large poultry project underway and a piggery unit.

d. Summary of Secondary School Visits

The survey team noted that the tutors of agriculture at the secondary level were generally more content with their professions than were MATI tutors. The one year professional training they received leading to a Diploma in Agricultural Education seemed to have developed this pride and commitment. Several secondary tutors mentioned their overall satisfaction with the motivation of their students.

Tutors at the secondary schools generally admitted that they are quite out of contact with researchers, extension workers, and farmers. They felt that their schools receive very few agricultural publications of Tanzanian origin. A very fine support service that the Ministry of National Education could provide is locating useful local publications and disseminating them to to the agricultural-biased schools and placing the schools on the mailing lists of agencies and administrative units which regularly publish locally-relevant materials. Tutors should also be kept up-to-date through annual participation in short courses designed for updating. The Ministry of National Education might cooperate with the Division of Manpower Development, Minstry of Agriculture, in developing such short courses and reference materials for staff. Supervisors could insist that tutors become more active in visiting agriculturalists who are active in the area.

Tutors at some schools said that few of the agricultural-biased graduates were entering MATIs. Iyunga Secondary School reported only two each from the 1976 and 1977 graduating classes of 165 and 222 students entered MATIs. This would seem to warrant some study and possibly some correction.

The agriculturally biased secondary school syllabus and MATI certificate syllabus show considerable duplication. In practice there seemed to be very little unwarranted duplication especially in practical training. The secondary schools semed to teach very little agriculture beyond the basic skills of crop cultivation and the development of positive attitudes toward manual work. The practicals related to livestock production and agro-mechanics appeared to be very weak in general, due to shortages of animals, equipment, and tutors. In the survey administered at MATIs, 83 percent of the 249 MATI students who had passed through agriculturally-biased secondary schools said there was "little" or "some" unnecessary duplication of the secondary school agricultural program in the MATI Certificate course.

F. Other Institutions Which Provide Agricultural or Related Training

Agriculture, being so important to Tanzania's economy, is offered in the curricula of many non-agricultural training institutions. These include:

1. Institutions Run by the Prime Minister's Office
   - Buhare College of Home Economics, Muema
   - Cooperative College, Moshi
   - 7 Cooperative Education Centres
   - 5 Village Management Training Centres
   - Village Management Training Program, Dar Es Salaam
2. Institutions Falling Within the Portfolio of the Ministry of National Education

a. 34 Colleges of National Education

The Butimba College of National Education offers a Diploma in Education (Agriculture) which enrolls agriculturally-trained certificate holders. The graduates become Education Officers, Grade II B, specializing in agricultural education.

The Ministry of National Education has plans to initiate a two-year Diploma in Agricultural Education at the College of National Education, Mpwapwa, in 1981, in order to generate a more reliable and better supply of teachers for agricultural-biased secondary schools. The Minstry would enroll Form VI leavers where possible and would thus, for the first time, be directly involved in teaching agriculture at the Diploma level.

b. 47 Folk Development Colleges

The purpose of this curriculum is well summarized in a recent government document:*

> It is government's obligation to establish at least one Folk Development College in each district, but so far only about 35 districts have such centres. The function of FDCs is to provide training for the leaders and members of Ujamaa Villages, including party leaders and members, farmers and housewives, as well as extension workers of all kinds and other public employees working in the villages. Courses are normally of three to six months in duration, but FDCs also conduct short courses, seminars, conferences, etc., of a few days or one to two weeks in length. The courses for leaders normally include practical agriculture and simple matters of economic development, including crop husbandry, animal husbandry. fisheries and forestry. Home economics and simple rural construction may also be taught.

3. Institutions Falling within the Portfolio of Chama Cha Mapinduzi

-Kivukoni CCM Ideological College

- 5 Zonal Ideological Colleges

4. Youth Training Centers

Most of these are run by private and church organizations. There are eight such centers which are actually agricultural schools. They conduct long general

*Taken from the Directory of Training Institutions, Ministry of Manpower Development, 1977, p. 109.

agriculture courses for primary school leavers who graduate with a certificate in farming. Some of the graduates are employed by the Minstry of Agriculture or the Prime Minister's Office as field assistants.

Other YouthTraining Centers include the National Service Camps which are under the Minstry of Defense and National Service and a number of home craft centers for young girls.

Some MATIs provide agricultural training to National Service youths, for example, three hours per day for three months.

Chapter X: FINANCIAL IMPACTS

Chapter X: Financial Impacts

A. Introduction

There are three areas in which financial impacts would occur if certain recommendations of the report are implemented. These are:

(1) Recurrent cost of emolument increases of new entrants to the public service;

(2) Recurrent cost increases of enlarged student enrollments;

(3) Capital costs of expanding MATI and University educational institutions.

In this chapter, the estimated unit costs for each of these are calculated upon the basis of available information. In-depth analyses were not done at this time. Such calculations would only have to be repeated again when and if decisions are taken to embark on a particular level of effort. However, the unit cost figures presented here will make it possible to do preliminary estimates of the impact of any proposed scale of effort eventually decided upon.

B. Recurrent Cost Emolument Increases in the Public Sector

The unit costs of civil servants at each educational level are estimated in the following way. First, the total number of new additional staff to be hired at each educational/position rank level is divided between those that are in the public sector, as contrasted with those who will be allocated to the parastatals, universities, and private organizations. The public sector numbers are then multiplied times the unit cost applicable to that level of officer. With regard to the diploma and B.Sc. levels of staff, separate calculations are made for entirely new entrants to the service, and for those who will receive increments due to promotion.

The unit costs of emolument increases are based on the salary levels found in the Establishment Circular Letter No. 4 of 1975. These levels of compensation are increased at three (3) percent per year to contain some minimal amount of inflation provision. There is no policy or legal basis for this calculation, but it seemed a

prudent course of action. It assumes that salaries will in fact be adjusted at some time to compensate for inflation. The salary levels of those individuals who advance through promotion (due to the higher educational qualifications achieved) are calculated by assuming each individual is on the mid-point of his old salary scale, and that the increment is at the entry point of the new scale earned. This turns out to be approximately 2,600 to 2,900 Tanzanian shillings per year.

Exhibits X-A through X-C give the incremental cost picture for each educational level's recurrent expenditure requirements, from 1980 through 1986. M.Sc. and Ph.D. staff levels are not considered as no special promotions are given for achievement of these degrees by the in-service employees; and direct entry of persons with higher degree qualifications does not receive higher salary levels than the entry into the professional cadre.

As the growth in the numbers of personnel on average is no greater than 7% (as noted in Exhibit IV-A), it is unlikely that coverage of recurrent costs would be a difficult problem. If the levels of trainees were to be raised significantly by changes in the allocation of manpower to the agricultural sector, these present computations would naturally have to be redone; and the financial impacts would require careful examination.

No calculations have been done for the support costs incurred on recurrent account when new staff are taken on board. This is a specialized type of budget management analysis which is beyond the purview of the present study. As noted in the utilization analyses in Chapter VIII, support costs for staff are a critical issue which should be looked into in the future.

Exhibit X-A

Certificate Level: Incremental Emolument Cost Increases of New Entrants to Public Sector, 1980 - 1986

		1979	1980	1981	1982	1983	1984	1985	1986
A.	Projected Supply[1]	3071	3097	3079	3209	3358	3506	3652	3807
B.	Incremental Output	-	26	-18	130	149	148	146	155
C.	Public Sector Increment (82% x B)[2]	-	21	-15	107	122	121	120	127
D.	Est'd Unit Cost (T.Shs. per year)[3]	-	8400	8652	8912	9179	9454	9738	10,030
E.	Incremental Cost Increase Per Year of New Entrants (C x D) (T.Shs.)	-	176,400	(-129,780)	953,584	1.12 m.	1.14 m.	1.17 m.	1.27 m.

Notes: 1. From Exhibit IV-A.
2. Derived from Exhibit III-C.
3. From Establishment Circular No. 4 of 1975. Scheme of Service for Professional and Non-Professional/Technical cadres in the Ministry of Agriculture.
Direct entry of new personnel from Form IV backgrounds with a two year certificate is on MS.1 scale.

Exhibit X-B

Diploma Level: Incremental Emolument Cost Increases of New Entrants and Old Employees in Public Sector, 1980 - 1986

	1979	1980	1981	1982	1983	1984	1985	1986
A. Projected Supply[1]	1366	1718	2107	2299	2445	2633	2833	3040
B. Incremental Output	-	352	389	192	146	188	200	207
C. Public Sector Increment (79% x B)[2]	-	278	307	152	115	149	158	164
D. 50% New Entrants/50% Old Employees[3]	-	139	195	76	58	75	79	82
E. Unit Cost of New Employees (T.Shs.)[4]	-	13,967	14,386	14,817	15,262	15.719	16,191	16,677
F. Incremental Unit Cost of Old Employees Promoted to Higher Level (T. Shs.)[5]	-	2,874	2,960	3,049	3,140	3,234	3,332	3,431
G. Incremental Emolument Cost Increases (T.Shs.)								
- New Entrants to Service (D x E)	-	1.94	2.80	1.13	.885	1.18	1.28	1.37
- Old Employees Promoted (D x F)		.40	.57	.23	.183	.25	.27	.29
Totals (in millions)		2.34	3.37	1.36	1.068	1.43	1.55	1.66

Notes:
1. From Exhibit IV-A.
2. Derived from Exhibit III-C.
3. Assumes that study recommendation to this effect is adopted.
4. From Establishment Circular No. 4, 1975. Scheme of Service for Professional and Non-Professional/Technical Cadres in the Ministry of Agriculture.
   Direct entry of new entrants from Form VI backgrounds is to MS.2 scale, at T.Shs. 1,130 per month, or Shs. 13,56(per year in 1979; and 13,967 in 1980, to take account of possible 3% inflation increase.
5. An estimate, assuming certificated diploma graduates are mid way through the certificate salary scale, which is approximately T.Shs. 2,874 less than MS.2 scale entry point. Therefore, an average increase was derived; and then inflated at 3% per year.

Exhibit X-C

Bachelors Level: Incremental Emolument Cost Increases of New Entrants and Old Employees in Public Sector, 1980 - 1986

		1979	1980	1981	1982	1983	1984	1985	1986
A.	Projected Supply[1]	708	663	686	668	740	792	853	907
B.	Incremental Output		-45	23	-18	72	52	61	54
C.	Public Sector Increment (62% x B)[2]		-28	14	-11	45	32	38	34
D.	70% New Entrants (70% x C)[3]		-20	10	-8	32	22	27	24
E.	30% Old Employees Promoted (30% x C)[3]		- 8	4	-3	13	10	11	10
F.	Unit Cost of New Entrants (T. Shs.)[4]	19,140	19,714	20,306	20,915	21,542	22,189	22,854	23,540
G.	Incremental Unit Cost of Old Employees Promoted to Higher Level (TShs.)[5]	-	2,587	2,664	2,746	2,827	2,912	2,999	3,089
H.	Incremental Emolument Cost Increases (T.Shs.)								
	- New Entrants to Service (D x F)	-	-.395	.203	-.167	.690	.488	.617	.565
	- Old Employees Promoted (E x G)	-	-.021	.011	-.008	.037	.029	.033	.031
	Totals (in millions)		-.416	.214	-.175	.727	.517	.650	.596

Notes: 1. From Exhibit IV-A.
2. Derived from Exhibit III-C.
3. Based on past proportions, and some projections.
4. From Establishment Circular No. 4, of 1975. Scheme of Service for Professional and Non-Professional/Technical Cadres in the Ministry of Agriculture.
Direct entry of new entrants with B.Sc. qualifications is to MS.3 scale, at T. Shs. 1,595 per month, or T. Shs. 19,140 per annum in 1979. Future years are based on average 3% per year inflation increase.
5. Unit cost for old employees assumes an increase from the mid-point on the diploma MS.2 scale to entry point on MS.3 scale, which is approximately 2,587 per year. This amount is then inflated at 3% per year.

C. Recurrent Cost Increases of Enlarged Student Enrollments

1. MATIs

The projected expansion of enrollments at MATIs shown in Exhibit IV-L indicates only a minor 2.8% increase from the 1,945 students in 1980 to 2,000 in 1986. The impacts on recurrent costs will therefore not be especially significant. They are computed in Exhibit X-D below, and are useful at this moment only for the specification of the unit costs which are likely to prevail in each year. Should policy decisions be made to allocate greater numbers to certificate and/or diploma training programs in the future, these figures can be utilized to update the calculations. The unit costs per student are based on the Ministry of Agriculture's best estimates, and are adjusted for 10% annual inflation each year.

Exhibit X-D

MATI System: Recurrent Cost Increases Projected, 1980-1986

	1980	1981	1982	1983	1984	1985	1986
A. Projected Enrollment[1]	1945	1852	1728	1774	1836	1919	2000
B. Unit Cost Per Student[2]	14,303	15,730	17,303	19,033	20,936	23,030	25,333
C. Estimated Recurrent Costs[3] (in mil. T.Shs.)	27.8	29.1	29.9	33.8	38.4	44.2	50.7

Notes: 1. From Exhibit IV-L.
2. Based on costs per student year utilized in paper entitled Agricultural Research Manpower Development, by Prof. M.L. Kyomo, Dean, Faculty of Agriculture, Forestry and Veterinary Science; and Dr. J.E.U. Mchechu, Director, Manpower Development Division, Ministry of Agriculture. Inflation factor of 10% per annum utilized.
3. C = A x B.

2. UDSM: Faculties of Agriculture and Veterinary Sciences

The projected enrollment at UDSM-Morogoro in agriculture and veterinary science are shown in Exhibits IV-H through IV-J. The increase is from 347 students in 1980 to 443 in 1986, or about 28% over the seven year period. Exhibits X-E and X-F below, compute the increase in recurrent costs to be incurred at each educational level.

The average recurrent unit costs for each B.Sc. student is about 26,000 Tanzanian shilllings per year; and for M.Sc. and Ph.D. levels it is approximately 40,000 Tanzanian shillings per year. These 1979 costs are inflated at 10% per year in the computations shown. There is a slight difference in the unit cost of agriculture and veterinary science students, which has been ignored here for the sake of simplicity.

It will be necessary to exercise significant caution with the enrollment figures as very recent events have indicated that intakes into the agriculture faculty have not kept pace with the study's supply projections in Chapter IV. Recurrent costs may in fact be less. Depending on the national manpower policy allocation decisions taken in the future, such figures will have to be recalculated.

Exhibit X-E

B.Sc. Level: UDSM-Morogoro Recurrent Cost Increases Projected, 1980-1986

	1980	1981	1982	1983	1984	1985	1986
A. Projected Enrollments[1]	156	246	304	300	300	300	303
B. Unit Cost Per Student[2]	28,600	31,460	34,606	38,067	41,873	46,060	50,667
C. Estimated Recurrent Costs (in mil. T.Shs.)	4.5	7.8	10.5	11.4	12.6	13.8	15.4

Notes: 1. From Exhibit IV-H.
2. Based on costs per student year utilized in paper entitled Agricultural Research Manpower Development by M.L. Kyomo, Dean, Faculty of Agriculture, Forestry, and Veterinary Science; and Dr. J.E.U. Mchechu, Director, Manpower Development Division, Ministry of Agriculture. Inflation factor of 10% per annum utilized on 1979 base cost of T.Shs. 26,000.
3. C = A x B.

Exhibit X-F displays the recurrent cost projections for M.Sc. and Ph.D. students.

Exhibit X-F

M.Sc. and Ph.D. Levels: UDSM-Morogoro Recurrent Cost Increases Projected, 1980 - 1986

	1980	1981	1982	1983	1984	1985	1986
A. Projected Enrollments[1]							
- M.Sc.	38	73	71	84	87	90	93
- Ph.D.	5	11	15	19	23	23	23
Total	43	84	86	103	110	113	116
B. Unit Cost Per Student[2]	44,000	48,400	53,240	58,564	64,420	70,862	77,949
C. Estimated Recurrent Costs[3] (in mil. T.Shs.)	1.9	4.1	4.6	6.0	7.1	8.0	9.0

Notes: 1. From Exhibits IV-I and IV-J.
2. Based on costs per student year utilized in paper entitled Agricultural Research Manpower Development, by Prof. M.L. Kyomo, Dean, Faculty of Agriculture, Forestry and Veterinary Science; and Dr. J.E.U. Mchechu, Director, Manpower Development Division, Ministry of Agriculture. Inflation factor of 10% per annum utilized.
3. C = A x B.

D. Capital Costs of Educational Institution Expansion

1. MATIs

The study recommends a minimum capacity expansion at MATIs from 2,219 to 2,774, or an increase of 555 student places. In Exhibit X-G, the 1979 unit capital costs per student of new facilities to be built are shown. This table gives the 1979 cost of construction, and would need to be adjusted for the proper inflation rates in construction and labour costs expected to prevail when expansion planning is at a more advanced stage. It has been suggested that construction costs are advancing at as much as 20% per year or more.

Exhibit X-G

MATI System: Estimate of 1979 Capital Costs of Expansion

Capital Cost Components	(1) T.Shs. Cost Per Student[1]	(2) Estimated Capital Cost (555 x Col. 1)
1. Classroom and Sanitary Facilities	2,570	1,426,350
2. Hostels and Dining Rooms	11,500	6,382,500
3. Laboratory Buildings and Facilities	2,000	1,110,000
4. Farm Facilities:		
a. Farm Machinery	4,300	2,386,500
b. Dairy, Poultry and Piggery	1,700	943,500
c. Livestock	860	477,300
d. Shops and Storage	1,060	588,300
5. Library Buildings	750	416,250
6. Library Books	1,000	555,000
7. Vehicles	2,000	1,110,000
8. Office and Administrative Facilities, Laboratory Equipment and Small Tools	2,500	1,387,500
9. Office Space and Staff Rooms	3,000	1,665,000
10. Tutor and Supporting Staff Housing[2]	47,300	26,251,500
Total Estimated Unadjusted Capital Cost		44,699,700
Add: Adjustment for Inflation (To Be Completed)		+
Total Adjusted Cost (To Be Completed)		

Notes: 1. Based on per student capital costs computed by Division of Manpower Development, Ministry of Agriculture.

2. Given the low and inefficient student:staff ratios prevailing and the need for consolidation reported in Chapter IX, the exact needs for additional tutor and supporting staff housing are not really known. This line's figures may possibly be vastly overstated. Only the facilities planning consultant recommended in the study will be able to arrive at a proper professional determination.

2. UDSM-Morogoro

As noted in Exhibit IV-N, it is expected that the Morogoro facilities may become overcrowded by 1985. In light of the recent news that intakes are not as high as originally projected, the expansion planning and estimated cost picture is not clear. The situation could change if national manpower allocation decision makers choose to expand the numbers of entrants in the years ahead. Therefore, only the unit costs per student of capital expansion are given. These are shown in Exhibit X-H, and can be utilized when making initial estimates of magnitude in the future.

Exhibit X-H

UDSM-Morogoro: 1979 Unit Capital Costs Per Student of Expanded Facilities

Capital Cost Components	(1) T.Shs. Cost Per Student[1]	(2) Estimated Capital Cost (? x Col. 1)
1. Classrooms and Furniture	4,950	
2. Hostels and Furniture	18,000	
3. Kitchen, Dinig Rooms and Furnituren	5,400	
4. Laboratories and Furniture	3,300	
5. Farm Facilities:		
a. Farm Machinery	4,300	
b. Dairy, Poultry and Piggery	1,700	
c. Livestock	360	
d. Shops, Stores, and Storage	1,000	
6. Library Buildings	1,650	
7. Library Books	1,000	
8. Vehicles	2,000	
9. Administration		
a. Administrative Block and Furniture	3,300	
b. Offices, Laboratory Equipment, Miscellaneous Equipment	5,000	
10. Tutor Houses and Furniture[2]	n/a	
Total Estimated Unadjusted Capital Cost		

-Table X-H continued-

Notes: 1. Estimates from Project Planning Section, Ministry of Education. Costs are for 1979, and would require inflation adjustments.

2. Presently there are 60 Class A Houses and 20 Class B Houses. Additional houses are being constructed, but the plans for expansion were not available at the time this study was written. As the student:staff ratio at the university is low and relatively inefficient at the moment, no major increases in staffing are contemplated. However, as Chapter IX notes, staff housing has been a problem and with the return of many faculty members from advanced study overseas, there may well be a significant need. The university planning consultant would have to look into this amongst other matters recommended.

Chapter XI: IMPLEMENTATION PLAN ACTION AGENDA

Chapter XI: Implementation Plan Action Agenda

The purpose of this very brief chapter is to facilitate thinking about the next steps to take in agricultural manpower production, education and utilization. The chapter presents a general outline of activities which may be useful in the actual setting up of an implementation agenda to plan and monitor progress towards resolution of the many problems discussed. Exhibit XI-A presents an outline of the major implementation activities required to be accomplished, the principal organizations who would be responsible for carrying out each activity, and the approximate sequence and schedule that might be feasible. The focus of the implementation planning schedule is only on the key issues raised in the study. The full text must naturally be consulted for more detailed coverage of every recommendation.

A. Considering the Report

1. Circulation of Summary Report of Study and Print-Outs

Feedback to those organizations and supervisory managers who contributed their time and information to the study is a first priority. Each organization and supervisory manager should receive a copy of the summary; and most importantly, each should receive a copy of the full set of pages from the computer print-outs on his/her organization unit. Thus, each DADO, for example, would receive a few pages of information that records his/her responses at the time of the survey. These print-out pages provide the format from which periodic updating of the survey can be done. They facilitate annual up-datings of filled posts, educational levels, and areas of specialization of staff. They also provide spaces where changes in future requirements can be noted.

A request for comments, suggestions, questions and ideas should be solicited, so that continual involvement of supervisory managers in the manpower planning process is possible.

2. Circulation of Full Report

Full copies of the report should be circulated to all the principal organiza-

tions concerned with manpower planning, educational system changes, and efficiency and effectiveness improvement, preparatory to holding a workshop on the study. A sampling of representatives of regional and district organizations, research institutes, MATIs, the larger parastatals, and other interested end-users should be included. Representatives of potential donors to improvement efforts should also be invited. Their participation may permit closer professional understanding of the issues faced, and engender continual teamwork on common problems of concern.

3. Workshop Discussions

Probably a minimum of three days are necessary for full consideration of the report's findings. Because of the size of the workshop, there should be at least one day each set aside for the manpower planning, agricultural education, and utilization issues. The utilization area may even require two days of discussions. The opening session should naturally be devoted to a review of the summary and the main points of the study. Then, given the likely large numbers of participants, small groups should be constituted that would meet in separate rooms. There, each participant would have an opportunity to individually express his/her views and to put forth the questions, comments, and requests for clarification that usually come up. Each group would then appoint a spokesperson who could report to the plenary session at which the matters raised could receive a proper response and full consideration.

4. Summary of Workshop Findings

The principal output of the workshop should be a summary of predominant consensuses that emerge from the discussions about what policy and program actions should be taken by top management. The workshop summary should also note those areas where consensus was not reached, and what the contending points of view are. This workshop summary should be circulated to all end users, as well as communicated to the decision makers.

The Exhibit XI-A, as supported by the full text, gives adequate indication of the activities to be carried out, and need not be repeated here.

Exhibit XI-A

Implementation Planning Schedule
and Responsibility Assignment Charting

IMPLEMENTATION ACTIVITY	ORGANIZATION RESPONSIBLE	TENTATIVE SCHEDULE 1980 Nov.	1980 Dec.	1981 Jan.	1981 Feb.	1981 Mar.	1981 Apr.	1981 May	1981 June	1981 July	1981 Aug.	1981 Sept.	1981 Oct.	1981 Nov.	1981 Dec.	1982 Jan.	1982 Feb.	1982 Mar.
A. CONSIDERING THE REPORT																		
1. Circulate Summary & Print-Outs	MOA/MDD	XX																
2. Circulate Full Report	"	XX																
3. Hold Workshop	"		XX															
4. Summary of Workshop Findings	"			XX														
B. MANPOWER ALLOCATION TO AG. SECTOR																		
1. Raise National Policy Issue	MOA/Min.			Raise		Discuss			Decide									
2. Priority Allocations to Research	MOA/MDD								Execute									
3. Raise MATI Entry Quality Levels	MMD/Trg.								Execute									
4. Diploma Entrants 50% Form VI	MMD/Trg.								Execute									
5. Raise Form VI & Diploma Entrants to UDSM (Morogoro)	UDSM			Begin											Execute Fully			
C. MATI SYSTEM																		
1. End Agro-Vet Retraining Courses	MOA/MDD			XX														
2. Facilities Expansion Planning	MOA/MDD			Secure Funds	Hire Cons.	Do Study				Design Project					Seek Auth. & Donor Funding			
3. End Agro-Vet Certif. Courses	MOA/MDD								XX									
4. Adjust Specialty Subject Course Production Proportions	MOA/MDD									XX								
5. Curriculum Revision and Teaching Methods and Materials Development	MOA/MDD			Continuing Major Process of Curriculum Revision and Teaching Methods & Materials Develop.														
6. Exam System Revisions	MOA/MDD				Prepare Revisions					Begin Implementation of Exam Revisions								
7. Expand OJT Assistance and Short Course Offerings	MOA/MATIs							Secure Funds		Implement in Areas of Viable Recommendations								
D. UNIVERSITY EDUCATION SYSTEM																		
1. Adjust Specialty Subject Course Production Proportions	UDSM			XXXX														
2. High-Level Working Party to Examine System	Cabinet/UDSM			Secure Funds	Hire Consultant													
				Appoint Group		Conduct Study						Submit Report	Discuss & Decide		Implement			
E. MANPOWER UTILIZATION IMPROVEMENTS FOR INCREASING STAFF EFFICIENCY AND EFFECTIVENESS																		
1. Research																		
a. Implement Farming Systems Approaches to Research	MOA/Rs&Ds			External Fund Raising Educational Efforts in Service					Secure Rec.Funds	Initiation of Few Pilot Projects							Expand Slowly	
2. Planning/Programming Processes	MOA/Rs&Ds			Secure Funds	Hire Consultant		Develop Ag Planning & Implem. Calendar Schedules				Establish Prof Advisory Groups for Pilot Areas					Implement APIC in Pilot Areas		

Exhibit XI-A (Part 2)

Implementation Planning Schedule
and Responsibility Assignment Charting

IMPLEMENTATION ACTIVITY	ORGANIZATION RESPONSIBLE	TENTATIVE SCHEDULE 1980 Nov.	1980 Dec.	1981 Jan.	1981 Feb.	1981 Mar.	1981 Apr.	1981 May	1981 June	1981 July	1981 Aug.	1981 Sept.	1981 Oct.	1981 Nov.	1981 Dec.	1982 Jan.	1982 Feb.	1982 Mar.
3. Training - OJT and Shor Course	MOA/Rs&Ds						Allocate More Funds for OJT/SCTrg.				Implement Selectively in Conjunction with Action Oriented Local Campaigns in Certain Areas							
4. Extension																		
a. Farming Systems Approaches to Research Collaboratively	MOA/Rs&Ds						Allocate More Staff and Recurrent Funds				Collaborate with Research Institutes and Villages in Various Phases in Pilot Areas				Expand Pilot Areas as Staff and Funds Permit			
b. Utilize Work Planning and Control Systems (T & V)	MOA/Rs&Ds			Educate Staff in Areas of Viable Recommendations Where Active Campaigns Are Planned, To Be Able To Operate Proper Supervisory Extension System							Implement in Appropriate Areas Without Overstretching Resources							
c. Paraprofessionals	Rs&Ds Villages Research Institutes MATIs				Design Variety of Paraprofessional Systems in Various Areas to Suit Local Circumstances in Collaboration with Villages							Test Various Systems in Farming Systems Research Efforts and in Local Campaigns						
d. Staff Deployment	MOA/Rs&Ds			Increasingly Concentrate Scarce Staff Resources to Achieve Effectiveness Allocate Staff to Highest Priority Areas														
5. Organizational Structures and Coordination																		
a. Collaborative Mode of Operations	Pres./PM			Draft Policy Reiteration		Issue General Policy Reminder												
b. Clarify Roles and Authority, and Necessity of Free Flows of Information	PMO			Draft and Issue Policy Reiteration Distinguishing Policy/Program Decision Making Authority from Advisory/Implementory Roles, and Need for Free Flows of Information														
c. Parastatal Collaboration	PMO/Rs&Ds Parastatals			Discuss Format for Coopted Membership in Regional and District Management Teams			Issue Policy Determination											
d. MOA Involvement & Support	MOA/Rs&Ds						Allocate More Funds for MOA Assistance Activities in Rs & Ds in Accord With Collaborative Policy Statement				Expand Travel, Information Sharing, Extension Materials Publication, Research-Extension Liaison, Distribution, and Non-Directive Advice Giving							
6. Finance and Logistics	Rs & Ds			Increasingly Concentrate Scarce Resources in Areas of Viable Recommendations and in Collaborative Action-Research Extension Projects														
7. Personnel																		
a. Promotion Systems Circular	MOA/Admin.			Draft and Issue Clarifications														
b. Accelerated Promotion System	PubSerCom			Study			Recommendations Submitted				Decide and Implement							

9/92

APPENDICES

Appendix A-I: TERMS OF REFERENCE

95/96

Second Draft

TERMS OF REFERENCE

TANZANIA AGRICULTURAL MANPOWER STUDY

Drafter: Roger J. Simmons
April, 1978

1527 Woodacre Drive
McLean, Virginia 22101

324

9/1/98

INDEX

SUMMARY

Goals: The study is designed to answer the following five questions with specific sets of recommendations:

1. How many persons are needed at each qualification level, in each specialty, for which agricultural sub-sectors over the next five years?

2. Given a set of manpower needs, how many persons can and how many persons should be produced by the training institution in the light of various constraints such as funding levels, general economic outlook, and so forth?

3. What can be done to improve the qualitative performance of pre-service, in-service, and adult education farmer training institutions with regard to both their programs and management?

4. How can the efficiency and effectiveness of agriculturally specialized manpower be enhanced through improvements in organizational structures, personnel system incentives, supervisory activities, and financial, logistical, informational and planning/programming systems and procedures?

5. In the light of recommendations on the above issues of manpower planning, education, and utilization, what would constitute the general outlines of an implementation plan to schedule the required activities?

An integral part of the study effort is to skill transfer and institutionalize the capacity to conduct such studies in the future within the Ministry of Agriculture.

Methods: Basic approaches involve:

1. A decentralized survey, with detailed questionnaires on supply, demand, education, and utilization, covering districts, regions, parastatals, other ministries, at each supervisory management level.

2. To utilize an unconstrained question on demand estimates, which is later scaled by budget limitations; but which nonetheless contains appropriate proportions with regard to educational qualification levels and fields of specialization.

3. To follow-up questionnaire data collection with interpretive interviews for greater depth.

Staffing: WVU/NCATSU - 2 Manpower Planner/Analysts (6 months each)
- 1 Agric. Education Specialist (3.2 months)
- 1 Manpower Utilization Specialist (6 months)
- 1 Survey Interviewing Specialist (2.4 months)
- 1 Reviewing Consultant (0.4 months)
Total of 24 Person-Months

Min. of Ag.- 2 to 4 persons (12 to 24 Person-Months)

Scheduling: -Start to Finish Estimate of Six (6) Months (Optimistic Est.)
-Contingency person days estimate of twenty percent (20%), making for pessimistic estimate of seven point two (7.2) months.

Second Draft

TERMS OF REFERENCE

TANZANIA AGRICULTURAL MANPOWER STUDY

Drafter: Roger J. Simmons
April 11, 1978

I. BACKGROUND

Demand and Supply of Agriculturally Specialized Personnel

Over the past 12 years there have been two manpower supply and demand studies done by the Ministry of Agriculture. The last was that done by Yeaman, Schwencke, and Wamunza in 1972; and before that the study by Nelson in 1967. Both of these attempted to grapple with the projection of manpower needs and the provision of trained personnel by the educational system. Within the confines of the methodologies used, each of these was able to contribute to policy making through their quantitative forecasting, as well as making recommendations relevant to qualitative aspects of agricultural education, and in suggesting utilization improvements.

There has always been and will likely always be continuing debate about the proper methodology to employ in manpower studies. Unfortunately, manpower planning is one of the more imprecise areas of development planning, and is not a fixed and exact science.[1] The Government of Tanzania and the Ministry of Agriculture in particular have been concerned about this issue for some time. They wish to make progress in evolving increasingly reliable projections upon which future educational intakes can be based.

The last two studies have been based on demand estimates being made by a limited number of persons at a centralized headquarters

location, using a combination of three basic approaches. The program approach attempts to secure a grasp of the number of agricultural projects and programs being carried out over a plan period, the workloads, and types of agricultural personnel needed to accomplish the specified tasks; and therefore the effective demand. The ratios approach posits a target set of optimum numerical relationships between different levels of personnel. For example, in the 1972 study, it was assumed that there should be a ratio of 1 graduate to 2 diplomats to 20 certificate holders to 10,000 farmsteads. Demand is then calculated to close the gap between existing and desired staffing magnitudes and proportions. The budget constraint approach takes the existing staffing pattern and makes projections for each level based on the expected annual increases in the personal emoluments line-item, and thus the number of personnel who can be afforded. The budget constraint is derived either from a ceiling set by the Ministry of Finance, or a review of average increases in past years.

Each of these approaches has its strengths and limitations. On the strengths side, they are useful in making estimates in a short time, at low cost, using certain rules of thumb as guidelines. There is a good amount of common sense and logic in the enumeration of projects and their personnel needs, just as it is only realistic to apply a budget constraint to any set of figures to keep them within the bounds of feasibility. Similarly, ratios are an expression of broad staffing patterns which experience might indicate have been desirable.

On the other hand, each of the above approaches also has its limitations. The major concerns which the Government and professionals in the field have about them are:

1. Programs and projects are always in flux and rarely does Government know all the agricultural efforts it will be making in coming years. In addition, since there is always a significant time lag between the point manpower demands are known and when training production could be increased, shortages would likely continue through the actual program implementation period.

2. Ratios tend to be inflexible, and thus cannot take into adequate consideration the diverse agricultural situations in the country which may require staffing patterns with significant variations.

3. Neither ratios nor budget ceilings consider changing needs from past patterns. They cannot capture sufficiently detailed information on specializations required, nor changes in the ratios among qualification levels, over time.

4. Neither the ratios nor the budget constraint approaches base their estimates on the volume of agricultural development work that has to be accomplished; and therefore what numbers and skills at which qualification levels are required to do the job in different parts of the country. Each is based on a broad formula which is unable to uncover the important practical differentiation needed among staff resources.

5. The above approaches do not utilize the opinions and perspectives of the principal supervisory managers in the field; and not even all of those at headquarters. These personnel can be expected to possess practical information about the agricultural development potentials and problems in their geographic and functional specialization areas of responsibility. The variations from place to place in farmers, crop and livestock patterns, and other situational factors so important in operational planning, cannot be sufficiently considered without detailed consultations.

The Ministry is therefore understandably concerned about its ability

to plan and justify an agricultural education and training supply capabilitywhich will respond to the genuine needs of the agricultural sector. It is further concerned about the utilization of personnel, in terms of their efficiency and effectiveness. The Ministry recognizes the fact that the country must minimize any wastage of expensively produced quality manpower in its daily operations.

In recognition of this situation, the Ministry of Agriculture, United States Agency for International Development, and the West Virginia/North Carolina Agricultural and Technical State University consortium have decided to collaborate on a study which will update the manpower projections, review the agricultural education institutions, and examine issues of manpower utilization.

Subsequent sections of the terms of reference attempt to spell out various aspects of these matters. Section II describes the General Purposes of the study by enumerating the particular questions which the study is attempting to answer. Section III gives the Detailed Objectives and Methods to be employed. Section IV indicates an Implementation Plan which covers activity scheduling, staffing, and logistical and cost factors. Section V concludes the terms of reference by noting the assumptions on which the study's inquiries and scheduling are based.

II. GENERAL PURPOSES OF THE STUDY

As the background section indicates, the purposes of the study are to respond with recommendations to five major areas of concern. The particular questions which the study poses are:

A. Demand and Supply

1. How many persons are needed at each qualification level, in each specialty, for which agricultural sub-sectors over the next five years?

2. Given a set of manpower needs, how many persons can and how many persons should be produced by the training institutions, in light of various constraints such as funding levels, general economic outlook, and so forth?

B. Agricultural Education and Training

3. What can be done to improve the qualitative performance of pre-service, in-service, and adult education farmer training institutions with regard to both their programs and management?

C. Utilization

4. How can the efficiency and effectiveness of agriculturally specialized manpower be enhanced through improvements in organizational structures, personnel system incentives, supervisory activities, and financial, logistical, informational and planning/programming systems and procedures?

D. Implementation Planning

5. In the light of recommendations on the above issues of manpower planning, education/training, and utilization, what would constitute the general outlines of an implementation plan to schedule the required activities?

III. DETAILED OBJECTIVES AND METHODS

This section attempts to specify the particular data collection objectives and general methods which will be employed in the study. This is done in part by listing the information needed, indicating the rationale for its collection, and noting how it will be utilized. Data collection includes not only quantitative aspects, but also qualitative factors In these activities, interpretive interviews will be conducted where applicable to document the factors influencing numerical estimates; and to gain relevant information which is not easily quantifiable. In the education/training and utilization sections, of course, interpretive interviews are the principal modes of data collection.

The sub-sections of the study detailed here are those for supply and demand, education/training, utilization, and implementation planning.

A. Supply and Demand

The two supply and demand inquires involve obtaining responses to a number of inquiries. The basic tasks can be divided into about eleven phased activities noted below.

1. Compilation of lists of users and suppliers of agriculturally specialized personnel.

While the vast majority of users and supplies are fairly well known, there is always the possibility that some oversight could occur. Double checking will be necessary. Public, parastatal, and private sub-sectors will be covered.

On the demand or user side, these will include:

a. Public Sector

(i) Ministry of Agriculture Headquarters, Regions, Districts
(ii) Other Public Sector Organizations
-Ministries of Education, Lands, Finance, Commerce and

Industry, Economic Affairs and Planning, Labor, Natural Resources and Tourism, Water Development and Power, Prime Minister's Office, Prisons, and National Service

(iii) Parastatal Organizations
-Producing or Holding Companies, Boards, Authorities, Banks, Institutes, Corporations, etc.
-Subsidiary Companies

(iv) Others

b. Private Sector

(i) Estates
(ii) Larger scale agri-business industries
(iii) Individual professions
(iv) Others

On the supply side, the following would be included:

c. Public Sector

(i) University of Dar es Salaam
(ii) Diploma granting programs at Institutes
(iii) Certificate granting programs at Institutes
(iv) Foreign institutions at university, diploma, and certificate levels
(v) Others

d. Private Sector

(i) Students from other institutions at all levels, with studies not financed or arranged by or through Government.
(ii) Other

To compile user and supplier lists careful consultations with known principal users and suppliers in both sub-sectors will be conducted, soliciting their information. Cross checks with the Bureau of Statistics, Ministry of Commerce and Industry and Finance Ministry private sector directories and lists will be made.

2. Compile a data base on existing user organizations, including information on all agriculturally specialized personnel at each level and in each specialization, with regard to:

a. Authorized establishment
b. Vacancies
c. Numbers in-post
d. Duty station
e. Basic educational level (elimu)
f. Technical/professional education (sifa)

g. Citizenship
h. Age
i. Departures from organizations due to retirement, death, dismissal, and resignation to employment outside the sector, over past few years
j. Specialty field

This data is to be obtained by examination of personnel records in the various user organizations, as well as through field interviews. Consistency cross checks between the sources can then be made to ensure heightened accuracy. Personnel records on departures are essential for computing annual average turnover rates. Other items permit useful cross-tabulations to be made among categories. Basic information on the immediately visible needs (present vacancies and non-citizens in-post) may be obtainable at an early point. Vacancies, non-citizen in-posts, and turnover rates are three of the four basic components necessary for requirements estimation. Factors affecting these levels will be ascertained.

3. Collect data on additional needs (and rationales) for the coming five years, by qualification level and specialization field.

The supervisory manager of each headquarters, region, and district organizational unit (or significant sub-unit) will be interviewed to obtain his/her estimates of the numbers of new positions required over the next five years. (This is in addition to each supervisory manager's contribution to the data base mentioned above in Section III.A.2.) The art and science in practical manpower planning at this moment indicates that the question about additional manpower needs should be asked in an unconstrained context. That is, respondents will be requested to use their professional judgements alone in responding to the inquiry, and not be constrained by budget limitations, policy directives, and other factors. Their professional judgements would likely be based on their perceptions of what their areas need, what support services farmers

require to deal with outstanding problems, or capitalize on particular opportunities for agricultural development. Such a question normally yields higher requirement figures (in the public sector) than can be funded. However, it avoids distorting the pattern of needs among qualification levels and specialization fields which are so critical to improved educational planning. It has the benefit of being based on the diverse field conditions which exist, the work volume, and is given by those officers closest to the situation. Where incumbent officers are too new to be fully acquainted with their areas, guidance to locate the most informed person(s) will be sought.

Interpretive information on the rationales for respondents' estimates will also be gathered to permit understanding of the professional and local contextual considerations involved. Inquiries as to prioritization of needs will also be carried out (<u>after</u> the basic unconstrained responses have been recorded), to attempt to capture the practitioners' sense of the trade-offs desirable among numbers and across specializations. In this way, more reasoned assessments of needs and budgetarily feasible "effective demand" can be made.

4. <u>Obtain data on projections of supply and relevant circumstances from the educational institutions</u>.

Information will be gathered by the agricultural education specialist and Manpower Development Division for the use of the manpower analysts, including the following:

a. Current enrollments (domestic and foreign institutions) by specialization
b. Institutional student place capacities
c. Wastage rates for each level
d. Outputs produced in past
e. Teacher:student ratios, actual, desired, and recommended
f. Approved short term plans for capacity expansions

Data sources would be the records of the Manpower Development

Division, the Directors and Deans of relevant institutions, the Ministry of Manpower Development, and the Ministry of Education.

5. Compare new position requests with supply projections.

This first step in the analytic procedures is designed to uncover the magnitude of possible imbalances between needs and likely supplies. Shortages and/or surpluses can thus be identified for each level.

6. Apply budget constraints to determine the numbers of personnel who could be hired, in order to derive "effective demand."

"Effective demand" is a central concept to more realistic manpower planning. The needs expressed by respondents in the survey represent unconstrained requests for new positions. Because it is usually impossible to satisfy all of these requirements under existing financial constraints, the figures for each level need to be subjected to a range of more likely budget limitations. "Effective demand" defines the numbers of personnel that can be hired under the assumption of particular annual increases in the personal emoluments line-item. A range of estimates can be given, including those for high, low, and expected.

To carry out this procedure, certain basic information is assembled: the percentage distribution of position requests across qualification levels; the present base budget for personal emoluments at each level; the projection of funds available at the likely constraint figure; and the unit cost for personnel at each qualification level. These figures then permit a calculation of how many positions could be established within the budget constraint.

7. Apply other constraints and factors of a judgemental nature which seem relevant to proper scaling of demand.

As with most all policy considerations there are a number of elements which cannot be encompassed within precise quantitative reasoning processes. There are such matters as the influence of general economic

conditions, competition among the sub-sectors for the limited supply of specialized personnel, the returns to be expected from an investment in training and personnel as compared with other investments, the trade-offs between investments in utilization improvement activities and those in increased staffing, and so on.

To deal with these issues, the quantitative effective demand figures will be set forth as the most precise statement possible to make under the existing state of the manpower planning methodology. Analytic discussion will then proceed based on surrounding situational factors that might indicate increasing or decreasing the levels of demand above or below present perspectives on budget limitations.

8. Convert effective demand into training requirements.

Once it is known how many people can and/or perhaps should be hired over the coming five years, the next calculation derives the numbers of personnel who should enter training. "Training requirements" figures are a function of effective demand plus three additional factors: the turnover rates uncovered through baseline data collection (see III.A.2.i.); the wastage factor of students who leave training due to death, resignation, course failure, or other causes; and the number of teachers needed to be produced at higher levels of agricultural education, to handle the enlarged student bodies at lower levels (which in turn is a function of desired ratios of students to teachers). Each of these factors, turnover, wastage, and derived teacher demand, will affect planning for the size of educational institution intakes and the facilities which will be needed for both staff and students.

9. Make recommendations about personnel levels, institutional capacities, and phasing of alterations in capacities.

This section would attempt to make recommendations regarding personnel numbers in the various sub-sectors, student place capacities of the training system, and how the scheduling of capacity alterations could

best be done. Options and rationales for varying alternatives would be presented where appropriate. Policy makers could then examine the choices and their consequences within a rational framework for decision making.

10. Report and analyze specialization needs by qualification level.

The personnel position requests in their unconstrained proportions at each level will be presented. The prioritization constraint data also collected would be analyzed in contrast with the unconstrained responses. The rationales for the requests of various specialty fields will be examined; and comparisons of current production with requested patterns will be noted. The results of these calculations will provide operating guidance to those who will implement alteration recommendations of the producing institutions' departments; and would allow readjustment of production in accord with the survey's responses where appropriate.

11. Resurvey sub-sample to validate data collection. It is desirable to have a check on the accuracy of the quantitative data collected, should time and funds permit. In the field of manpower planning in developing countries personnel projections are naturally based more on practitioner estimates than rigorous and detailed calculation of scientifically determinable workloads. Given present shortages of qualified staffs to carry out complex planning tasks, it is only natural that there is a dearth of detailed knowledge. Most practitioners are so busy carrying out routine operations, that they do not normally have time to devote to planning. This is the reason, in part, for the relative imprecision of the science. However, practitioners do usually have a good intuitive feel for the general scale of the work to be done, and the areas in which effort should be expended to return the greatest value. These are the reasons why the methodology is built on their estimates, rather than those of relatively isolated central managers or planners alone.

Nonetheless, a resurvey of a sub-sample of respondents by different interviewers would be able to indicate what measure of confidence can be placed in the original survey, from a statistical point of view.

B. Agricultural Education and Training

The agricultural sector in Tanzania relies on the products of the agricultural education/training system to provide it with specialized manpower to perform the functions which are required by the development goals of the country. The user agencies require persons with the knowledge, skills, and behaviors relevant to their endeavors. The agricultural education system consists of pre-service post-graduate, degree, diploma and certificate programs in a number of fields; as well as domestic and international staff development training, and adult education farmer training efforts.

The agricultural education system has two major dimensions by which it can be looked at: that of its programs to serve user agencies; and that of its organization and administration. Each of these dimensions will be examined in the attempt to respond to the basic inquiry regarding what can be done to continue to improve the qualitative performance of the agricultural education institutions.

An assessment of the programs of the institutions covers a number of subject areas to do with quality and relevance of training. These include the following activities:

--Assessment by supervisory managers of staff performances as related to education, assessment by present and former students, assessment of relevance of education to tasks performed on the job, capacities of institutions in terms of curricula offerings, training methods, materials, timing of courses, libraries, research, consultancy and other supplementary missions of education institutions.

--Assessment of the organization and administration of the educational/training function involves examination of guiding policies, institutional planning, staffing, costs, budgeting processes, capital development plans, financing, physical plant, facilities utilization, intakes, wastage, output, efficiency and effectiveness of operations, internal and external

coordinative structures, and so on.

The basic method for undertaking these tasks will be the interpretive interview with the heads, staff and students of institutions, education system administrators, and user officials at all levels. Some basic data will be gathered by the interviewing teams from supervisory managers in the field. Most information however will come from the education specialist's own weeks of interviewing. Because of the on-going efforts of the WVU/NCATSU technical assistance team, a recent project evaluation, and past examination of curriculum development, agricultural education, continuing education and library, the number of person-weeks required for fulfillment of this set of tasks is fewer than for other sections of the study.[2/]

The particular areas of programs into which the education specialist will inquire are as follows:

1. Supervisory managers' views of education and staff performance. Part of the questionnaire to be administered will be a section which asks for information on the following:

   a. Rating of adequacy of training for staff immediately after leaving institutions.
   b. Specification of the areas of adequacy and inadequacy.
   c. Opinions to explain less than adequate performance.
   d. Suggestions for remedying inadequacies.

2. Staff's views of adequacy of training as related to the nature of field work and the quality of their own performances.

Another form for field interviewing will seek a sampling of opinion from staff at each level with varying lengths of service. It will request information similar to those items noted immediately above.

3. Relation of education and training to work tasks. A sample of staff at each level will be asked to list their major duties and tasks, and the percentage time spent on each of them. This should provide a view of the nature of the practical work done, which can be compared with training curricula.

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4. Examination of curricula.

The existing and future plans for curricular offerings will be viewed. The essential data to be collected concerns:

a. Types of programs offered, with which emphases and approaches.
b. Client groups and individuals for each program.
c. Objectives of each program curriculum.
d. When offered.
e. Where offered.
f. How up-dated and evaluated.

The major curricula will be examined in terms of their educational quality (level of complexity, sequence in learning process, comprehensiveness, testing, evaluation, etc.); and relevance (to the agricultural economy, practical field conditions, national priorities, etc.). Problems and suggested remedies will be identified.

5. Training methods and materials.

The strategy and tactics with which knowledge, skills and behaviors are taught frequently determines the success and efficiency of the educational process. An examination of the major teaching methods will be made, their appropriateness, the problems experienced with various methods, their timing, sequence, and the skill with which they are utilized Similarly, samples of the materials available with which to work will be surveyed, noting relevance, effectiveness, and adaptations to field conditions. The prospect for improved modularized materials will be examined, looking for the least cost, time, and widest possible utility in materials development. Who could develop them, how long it would take, when such materials could be developed, and how the trainers could be trained will be explored.

6. Non-teaching functions of agricultural educational institutions.

The supportive work which institutions do through library resources applied research, consultancies, outreach and other programs will be appraised. These functions will be examined from various points of view such as contributions to the teaching function, effects on faculty

development, cost-effectiveness, contributions to self-reliance, benefits to farmers, and so forth. Implicit in this subject is the assessment of the utility values which such activities may have for the agricultural sector, the trade-offs among them, and what comprises a proper balance.

The organization and administration inquiries consist of the following:

7. Policies and educational system planning.

An examination of the guiding policies and rationales for agricultural education in Tanzania will be made. System planning based on strategic goal selections will then be analyzed. As with so many other facets of this study, the process will be looked at in the light of desirability, feasibility, and consistency criteria. Dilemmas with goal decision desirability, feasibility constraints, consistency among objective will be probed. Suggestions for improvements in policies and system-wide planning will be made.

8. Financial resources and planning.

The adequacy and procedures by which finance is planned and made available to the agricultural education system will be considered. Costing and estimates processesfor capital and recurrent budgets will be looked into, deriving unit costs for facilities, staff, and students wherever possible. Problems will be identified and remedies will be suggested.

9. Physical resources and planning.

The adequacy and procedures by which physical planning is done, involving fixed plant, equipment and other facilities, utilization measures, design issues and others will be examined for areas in which useful suggestions might be made.

10. Staff resources and planning.

The quality of staff resources and their capacity to meet current and projected needs will be examined. The academic backgrounds and other

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experiences of faculties will be analyzed as related to the subjects taught, methods and materials used, and relevance to field situations. Staff planning for the future will be covered. This is a sensitive area, and any information collected will refer only to groups and numbers, without reference to individuals. (In passing, it should be noted that all individual personnel information here and elsewhere in this study will be kept entirely confidential.) Recommendations will be made where appropriate relating to strengthening staff resources

11. Student resources and planning.

Data will be collected about and consideration given tc items such as the following: intake pools, intake numbers, backgrounds and qualities of intakes, recruitment and selection standards and procedures, receptivity of participants to training, socio-cultural fit with future clients, wastage, and outputs for each level and specialization. The cost implications will be examined, alternatives investigated, and system efficiency and effectiveness assessed.

12. Internal and external coordinative structures.

Within any educational institution, among institutions, between institutions and their headquarters, between institutions and their output users, and between institutions and their immediate community environments, there are usually numerous issues. Communications, cooperation, and coordination is a never ending process fraught with continuing difficul ties. As these affect the efficient and effective management and planning of operations, problems will be identifed and suggestions made for improvement.

In appraising any educational system, there are rarely scientifically precise measures of universal validity. Assessment is necessarily a

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subjective area which cannot always be certain. This is even more true when the observor may be from overseas. The education specialist will therefore approach his tasks with full recognition of this, relying on his Tanzanian colleagues. He will attempt not to portray certainty so much as to contribute to relevant discussion of common professional issues.

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C. Manpower Utilization

Generally speaking, there are two principal methods of increasing the efficiency and effectiveness of agriculturally specialized manpower. The section on agricultural education will attempt to uncover ways in which the training function can contribute to these goals. A complementary approach is to find ways of improving the management of human resources particularly as regards planning, supervising, supporting, motivating, and organizing.

In this study questions on manpower utilization will be asked in order to identify problems and bottlenecks which have affected work performance in the agricultural services delivery system. A special section of the survey instrument will be devoted to utilization issues, and further interpretive interviews will be held by the management specialist to supplement the basic data. Suggestions to cope with the problems identified will be put forth.

The major areas in which inquiries will be made include the following

1. Personnel system

a. Position descriptions/job analyses. Is there a close relationship between what is done on the job, and the educational qualifications? Do job descriptions fit the positions? What changes should be made, and how?

b. Recruitment and selection. Is search pattern effective? Suitability of criteria used? Schemes of service? Relationship between academic credentials and work performance?

c. Placement. How done? Efficacy? Criteria employed? Matching of individual preferences and organizational needs? Handling of transfer requests? Turnover in postings? Causes? Effects?

d. Remuneration. Policies and problems? Cost of living issues? Increments? Bases and procedures? Allowances? Junior most staff conditions? Women employees, contracts, allowances?

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e. Performance Incentives. Increments on merit? Competition? Promotion? Recognition, bonuses, awards, symbols, length of service citations? Results of present policies and procedures? Problems and suggestions?

f. Staff development. Efforts to identify and assess talent and potential? Rotation programs? Optimum length of assignments? Mobility blockages in system? Inter-organization personnel exchanges?

g. Personnel Files. Form, accuracy, utility for planning and routine administration?

2. Supervision

a. Orientation and induction training. How done? Where and When? For whom? Adequacy and effects?

b. Work Planning and Control. Joint planning work schedules, objectives specification, performance standards, use of monitoring inspections, charts, tables?

c. Performance appraisal. Present practices, forms, feedback mechanisms? Credibility and understanding of system?

d. On-the-Job Training. Formal of informal OJT? Coaching and counseling approaches?

e. Training Needs Assesment and Planning. Practices? Capability for? Institutionalization? Who does, when, how? Coordinated with supervisors and training specialists?

f. Performance Sanctions. Rewards, corrections, negative sanctions? Disciplinary processes? Relative effectiveness?

g. Leadership and Human Relations. Skills in interpersonal and group dynamics? Sharing goals, proper use of authority, clear communications, concern for subordinates, staff meetings, motivation, role modelling?

3. Budget and Finance

a. Estimates procedures. Quality level of estimates? Timeliness?

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Accuracy? Form? Routing of submissions?

b. Funding levels. Adequacy? Significance of constraints? Imbalances? Priority items?

c. Disbursement procedures. Major rules and regulations. Delays? Bottlenecks? Lead times? Effects and causes?

4. Logistics

a. Supplies and Equipment. Quality of procurement calculations? Advance planning? Stockist supplies, transport, storage, security, inventory records and control, distribution processes, reorder systems?

b. Transport. Petrol, oil, lubricants, maintenance and repair, needs calculations? Spatial factor? Boarding procedures?

c. Travel/Accomodation. Bus fares, bicycle allowances, use of personal vehicles, accomodations, etc?

d. Farm inputs. Timeliness of arrival, and proper distribution.

e. Housing. Urban and rural locales. Effects?

f. Other.

5. Information Communication

a. Availability. Existence of useful information stocks in both administrative and technical research fields? Sources?

b. Flows. Incentives to communicate information? Capability to communicate? Networks? Methods used? Accuracy and timeliness of flows? Receiver receptivity? Feedback? Organization for dialogue of producers and users? Major filters and blockages? Effects?

6. Organizational Structures

a. Internal structure. Authority relations; chain of command; unity of command; span of control; divisional breakdowns as related to functions, processes, clientele, and area?

b. Headquarters-field relations. Decentralization approaches, effects on cooperation and coordination of service delivery to farmers?

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c. External relations. Inter-organizational/ministerial processes and effects on manpower efficiency and effectiveness? Linkages?

7. Planning/Programming

a. Cycle of events. Calender of activities for each organization level? Timing, accuracy, comprehensiveness, coordination; skills, time, and motivation to plan? Institutionalization of processes?

8. Agricultural and Rural Development Processes -- and Cost-Effectiveness

a. Approaches. Values to be maximized: participation, control, learning, equity, growth, national and local priorities, and consequences for efficiency and effectiveness.

b. Extension technology. Individual farm visits, group methods? Targeting of clienteles? Methods selection and appropriateness for area situations?

c. Generalists and specialists. Economizing on manpower?Feasibilit

d. Deployment. Concentration, scatteration and balance.

e. Womens' roles. Recognition and extent of utilization?

D. Implementation Planning

The aims of the implmentation planning section of the study are to take the principal recommendations made and evolve:

1. Activity schedules. A set of bar chart schedules will be developed to indicate the principal tasks and sequences required to implement the major recommendations. Approximate lead times and beginning and completion dates for each activity would be estimated.

2. Rough cost estimates. All recommendations involving major capital and recurrent costs would be estimated in a preliminary way. Detailed cost estimates would be impossible at this state of program and project development; but some rough scaling of the magnitude of funds involved might be of use.

3. Administrative guidelines. Suggestions on the manner of implementation will be given.

IV. STUDY IMPLEMENTATION PLAN

The supply and demand, education, and utilization sections of the manpower study are closely inter-related. Data collected in one aspect feeds into computations for another, and is then employed for analysis by still another. Similarly, the data collection process involves both quantitative and qualitative elements; and naturally both must be brought together in evolving reasoned recommendations that fit particular situations. A great deal of integration and coordination are therefore necessary in the design and implementation of the tasks and schedules as well as the staffing, and logistical support patterns. Such efforts usually require exceptional flexibility from both the individuals involved in the study, as well as from their sponsoring and cooperating organizations. Fundamental to the endeavor is a basic consensus on and understanding of what goals are sought by the study, and what basic approaches are to be taken to achieve them. Next in importance is the recognition of the level of effort to be required, especially the time commitments of personnel, funding by sponsors, and the essential logistical/administrative supports.

This section attempts to deal with these and other questions. What should be done is covered in Section III of this document. When it should be done, the task and activity schedules are then specified. Who should do it, the staffing pattern, individual responsibilities, general qualifications and scheduling of staff are dealt with next. What facilities are needed, the logistical requirements follow. How much it might cost, the factors which enter into such computations are then noted.

A. Activity Scheduling

1. Task Identification, Workload Analysis, and Time Estimation.

There are seven main phases to the study for the consultants; the time estimates of each phase are noted below.

	Days	
a.	15	Pre-Departure Design. Basic orientation and preliminary work on study instruments and data processing arrangements.
b.	12	Orientation and Team Formation. Briefing by Ministry officials, finalization of terms of reference, scheduling and travel arrangements.
c.	21	Questionnaire Design, Testing, Revision, and Interviewer Training.
d.	42	Data Collection. Field and Headquarters Interviewing.
e.	18	Data Processing and Analysis. Questionnaire editing, coding, verification, processing and basic analyses.
f.	24	Draft Report Writing, Typing, Reproduction.
g.	24	Workshop Reviews and Report Finalization.
	156	Total Days (Optimistic Estimate)

Estimates of the time for completion of each of these activities are necessarily subject to change as events unfold. A twenty percent (20%) allowance for contingencies will be budgeted in person-day figures, in addition to the above optimistic figure. Time estimates have been made on the basis of experience elsewhere in similar endeavors; and a workoad analysis of the major data collection task.[3/] The seven week data collection phase is based on the following calculations:

20 regions (field)
96 districts (field)
6 MOA headquarters divisions (headquarters)
6 other ministries using agriculturally specialized manpower (headquarters)
13 parastatals (headquarters)
? parastatal boards, institutes, and subsidiary companies (field and headquarters)
15 private firms (headquarters)

156+ number of interviews, plus unknowns (of which 116+ are in the field; 40+ are primarily at the headquarters)

At an average of one interview per day, an optimistic estimate is that four interviewing teams will take six to seven weeks to perform

TABLE I: ACTIVITY SCHEDULE

Tasks	Days	Weeks- 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32
a. Pre-Departure Design	15	XXXXXX
b. Orientation and Team Formation in Tanzania	12	XXXX
c. Questionnaire Design, Testing, Revision, and Interviewer Training	21	XXXXXXXX
d. Data Collection	42	XXXXXXXXXXXXXXX
e. Data Processing and Analysis	18	XXXXXXX
f. Draft Report Writing, Typing, Reproduction	24	XXXXXXXXX
g. Workshop Reviews and Report Finalization	24	XXXXXXXXX
	156	

20% Contingenc Days

TABLE II. DETAILED ACTIVITY SCHEDULE

Tasks	Weeks- 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32
1. Pre-Departure Design	XXXXXX
2. Orientation and Team Formation in Tanzania	XXXX
3. Questionnaire Design	XXX
4. Pilot Testing Questionnaire	XXX
5. Interviewer Training	XXXXX
6. Questionnaire Revision	XXX
7. Field Interviewing	XXXXXXXXXXX
8. Headquarters Interviewing	XXXXX
9. Data Collation and Processing	XXX
10. Data Analysis	XXXXX
11. Preliminary Draft Report Writing and Typing	XXXXXXXX
12. Workshop on Preliminary Report	XXXXX
13. Report Revision	XXX
14. Final Report Submission and Policy MakingWorkshop	XXX

20% Contingency Days

the data collection phase.

2. Workload Schedule. A schedule portraying these seven phasesof the study is shown in Table I. A slightly more detailed breakdown is depicted in Table II.

B. Staffing

1. Size of Team. The size of the team is determined by four factors. First, the workload to be accomplished within a certain time frame; second, the range of skills required; third, the objective of skill transfer from more to less experienced data collectors and analysts in order to be able to institutionalize future capabilities; and fourth, the desirability of having two interviewers whenever possible for the methodological benefits it brings -- accuracy in recording, ease of form filling, reality-checking from different perspectives, and the filling of local experience and inter-cultural gaps (if the teams are comprised of one Tanzanian and one expatriate each).

As noted in the immediately preceeding section, four interviewing teams will allow the job to be done in about six to seven weeks (an optimistic time assessment). For skill transfer, four or more Tanzanian colleagues would provide a solid base of newly experienced personnel in manpower planning. If only one or two persons were involved, there would be a higher risk that they might be transferred elsewhere; and never be available to utilize the skills again. Further, as properly supervised interviewing is an important insurer of study accuracy, four experienced persons would respond to this need. Should the Manpower Development Division be able to identify experienced Tanzanian manpower and survey research interviewers/analysts who would be able to give the estimated minimum of six months to the project full time, expatriate consultant positions could be reduced commensurately. It is the understandable shortage of readily available Tanzanian colleagues with these skills

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or time to devote to the project which has created the demand for consultant participation. Thus, prudent planning should proceed along the minimum of 24 person-months of consultant time, with about six consultants involved. Detailed breakdowns of consultant skill areas, major responsibilities and general selection criteria are given below.

2. Consultant Skills, Primary Responsibilities, and Selection Criteria

a. Human Resource Planner and Analyst I. (166 - 199 Person-Days)

(i) Conceptualization and design of quantitative manpower data collection instruments; and contributions to education and utilization instruments.

(ii) Training of interviewers.

(iii) Participation as interviewer in data collection, and supervision of other interviewers.

(iv) Principal analyst of quantitative manpower data.

(v) Drafter of quantitative findings and recommendations; and contributor to all other sections.

Selection criteria would include considerable experience with human resource studies, research management, survey research, interviewer training, statistical analysis, familiarity with computer processing, developing countries and preferably East African and rural development experience.

b. Human Resource Planner and Analyst II. (166 - 199 Person-Days)

(i) Contribute to all tasks for which Planner and Analyst I is responsible.

Selection criteria similar to above.

c. Survey Research Interviewing Specialist. (58 - 69 Person-Days)

(i) Responsible to Planner andAnalyst I, this position would provide from from 58 - 69 days of interviewer training and field interviewing. (Inclusion of this position becomes essential because the responsibilities of the WVU agricultural education specialist will not permit the latter's participation as a survey interviewer. The education specialist must spend all of his available field time in interpretive interviews with the relevant institutions.)

Selection criteria would include experience with consultancy studies, interviewing, survey research, and analysis. Familiarity with developing countries and East Africa are desirable.

d. Agricultural Education/Training Specialist. (83 -105 Person-Days

(i) Design of instrument questions relating to relationship of

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education and jobs.

(ii) Training of interviewers in proper utilization of above instrument.

(iii) Design of interpretive interview guidelines for educational institutions, including quantitative data on students, staff, and finances needed by Planner/Analyst I.

(iv) Interviewer of pre- and in-service, and adult education farmer training institution heads, staff, students, and system managers and users.

(v) Analyst and drafter of findings and recommendations to facilitate qualitative improvements in both program and organ-ication and management areas.

Selection criteria would include extensive experience with agricultural education and training programs in Africa, major institutional planning and management of training operations. Sensitivity to complex management and organizational issues.

e. Manpower Utilization Specialist. (166 - 199 Person Days)

(i) Design of interview guidelines and questions relating to utilization issues.

(ii) Training of interviewers in proper utilization of above segments of study questionnaire.

(iii) Participation as field interviewer in data collection.

(iv) Analyst and drafter of findings and conclusions.

Selection criteria would include familiarity with African management and organizational issues, planning/programming of agricultural/rural devel opment, organizational analysis, supervisory systems, budgeting, logistics, personnel, and leadership and training issues.

f. Reviewing Consultant. (10 - 15 Person-Days)

(i) Reviewing all draft findings and recommendations for desirability, feasibility, and consistency, bringing fresh perspectiv to study team's drafts.

(ii) Review methodology employed.

(iii) Suggest additional or alternative interpretations of data, and other analyses. Draft revisions.

(iv) Make editorial contributions to structure, order, phrasing, data display, and general presentation of report.

Selection criteria would include extensive experience in human resource and institutional planning, survey research and methodology, agricultural and rural development planning; and editorial skills.

3. Staffing Schedule

Table III indicates the detailed tasks and timing of activities for each position, with estimates of person-days for each.

TABLE III. STAFFING SCHEDULE

POSITION Tasks	Min Person Days	Weeks- 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32
MANPOWER PLANNER/ANALYST I MANPOWER PLANNER/ANALYST II MANPOWER UTILIZATION SPECIALIST		
1. Pre-Departure Design	15	XXXXXX
2. WVU Orientation	2	X
3. Travel to Tanzania	2	X
4. Tasks-Numbers 2 thru 8	75	XXXXXXXXXXXXXXXXXXXXXXXX
5. Travel to U.S.	2	X
6. Tasks-Numbers 9 thru 11	42	XXXXXXXXXXXXXX
7. Travel to Tanzania	2	X
8. Tasks-Numbers 12 thru 14	24	XXXXXXX
9. Travel to U.S.	2	X
Total Person Days Each	166	
AGRICULTURAL EDUCATION SPEC.		
1. Travel to Tanzania	2	X
2. Orientation	6	XXX
3. Instrument Design	6	XXX
4. Interviewing Institutions	24	XXXXXXXX
5. Travel to U.S.	2	X
6. Draft Report SectionWriting	20	XXXXXXXX
7. Travel to Tanzania	2	X
8. Tasks-Numbers 12 thru 14	24	XXXXXXX
9. Travel to U.S.	2	X
	~~88~~	
SURVEY INTERVIEWER SPECIALIST		
1. Travel to Tanzania	2	X
2. Tasks-Numbers 5 thru 8	54	XXXXXXXXXXXXXXXXXX
3. Travel to U.S.	2	X
	58	
REVIEWING CONSULTANT		
1. Review, Revise, Edit	15	XXXXXX
3 Staff at 166 PDs Each	498	
1 Staf at 88	88	
1 Staf at 58	58	
1 Staf at 15	15	
TOTAL	~~659~~PDs	(Approx.110 Person-Weeks: 27 Person-Months: 2.5 Person-Years)

Ey

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4. General Selection Criteria. Other criteria which apply to all overseas consultants are: interpersonal skills for working in groups cooperatively; inter-cultural sensitivity; willingness to travel extensively in rural areas; interest and commitment to practical development studies.

C. Logistics

The capacity to execute the schedule depends on a number of supportive services being provided fully and on time. They are as follows:

1. Transport in Tanzania

   a. Headquarters orientation and coordination: 1 vehicle or extensive taxi use.
   b. Questionnaire pilot testing: 4 vehicles
   c. Field Interviewing: 4 vehicles
   d. Headquarters interviewing: 1 vehicle, extensive taxis
   e. Drivers for each vehicle are desirable.
   f. Spare parts availability.
   g. Petroleum, oil, lubricants.

2. Travel Schedules and Accomodation Arrangements. These would be made during the first two weeks within Tanzania.

3. Per-diems. For overseas and Tanzanian team members, and drivers, for field trips.

4. Housing for Visiting Consultants. Firm and confirmed reservations would be required at hotels or the provision of other housing facilities to hold 4 to 5 consultants adequately. A car and driver would be required if housing is too far from the MOA.

5. Office Space. To handle from 5 to 8 persons on a regular basis, at least three good sized offices are desirable. Air conditioning would be desirable for productivity impact.

6. Office Equipment. Three well functioning typewriters would be desirable as many team members would probably draft documents on typewriters themselves. This would cut down on secretarial services needed. Other equipment includes: desks, chairs, photocopy machine or immediate access, fans (if no AC), mimeo machines, three electronic calculators (battery), etc.

7. Secretarial Services. One full time secretary is desirable at any time the team is working in capital. At short peak workload periods, additional assistance will be needed.

8. Materials and Supplies. Up to 5,000 photocopy pages, minimum of

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30 reams of mimeo paper, stencils, pens, pencils, erasers, paper clips, staple guns, staples, correction fluids, drawing kit for stencils, envelopes, glue, etc.

9. Imprest Account and Reimbursement Procedures. Provision should be made for adequate funds to handle above logistical arrangements, and to permit reimbursement of expenditures for justifiable purchases by any consultant team member of incidental items (maps, books, documents, petrol, rulers, paper, etc.).

10. Computer Processing, Coding, Verifying, Programming, Running Time.

11. Excess Baggage Allowances. Because of reference materials needed, data carried to and from Tanzania for analysis, 300 pounds of excess baggage should be permitted over the course of the project, involving one and one-half round trips.

D. Cost Items

In addition to the logistical supports which have costs associated with them, the following appear to be the major heading breakdowns.

1. International Travel

4 team members two round trips each, US.-Tanzania
1 team member one round trip, U.S.-Tanzania
2 Tanzanians one round trip, U.S.-Tanzania

2. International Travel Per Diems. For each of above trips, two days in transit.

3. Per-diems in Tanzania.

5 persons for varying lengths, with adjustments for travel outside capital city
2-4 Tanzanian colleagues for travel outside capital city
4 drivers for travel outside capital city

4. Per Diems in U.S..

Pre-Departure Orientations - 4 team members for 2 days each at WVU
Data Collation and Analysis - 3 team members for 3 weeks at WVU
- 2 Tanzanian colleagues for 3 weeks a- WVU
Preliminary Report Drafting - 2 Tanzanian colleagues for 2 weeks at WVU or in Washington area

5. U.S. Travel.

Pre-Departure Orientations - 4 members, Washington-Morgantown Retur
Data Collation and Analysis - 3 members, " " "
Preliminary Report Drafting - 3 members " " "
- 2 Tanzanian colleagues " " "

5. Communications. Domestic and International Cables, Calls, and Postages.

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V. ASSUMPTIONS

It is usually helpful to examine the sometimes hidden assumptions on which a study's goals, methods, resources, and scheduling are bassd. These assumptions provide some insight into the possibility of where and when events and activities could encounter problems. Such a process may be of assistance in anticipating difficulties, framing possible responses, tracing out their implications, and facilitating adjustments. The following are noted:

1. Objectives and Methods of Study. It is assumed that the questions asked are those which are most important to answer; and that the methodologies chosen will best achieve the results desired. For example, it is assumed that supervisory managers at all levels are those best informed about their areas of responsibility, that personnel numbers are an important aspect of agricultural development efforts, and that training directly affects work performance. New conceptual thinking and field conditions may change these, with a need to reformulate aspects of both.

2. Expectations of Study. The terms of reference attempt to cover a wide range of factors under each major line of inquiry. This is to ensure fairly comprehensive coverage in data collection. However, it would be misleading to think that all aspects can be covered with equal thoroughness in the time allowed and with the resources devoted. It would further be unrealistic to expect that any extraordinary revelations or solutions will be forthcoming, especially in the fields of education and utilization. Both of these areas have received attention in the past from many well-qualified and gifted observors, domestically and internationally. These studies are part of a continuing process of examination, learning, experimenting, monitoring, assessment, learning, and re-examination so necessary to human development.

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What can reasonably be expected is that this study's recommendations would contain specific suggestions for incremental improvements that are implementable in the short and medium term. Not all issues will be addressed, as the bias will be to single out the do-able, rather than the desirable-but-not-so-feasible matters. Nonetheless, longer range and other basic issues will not be ignored.

3. Staff Resources. The study is premised on the ability to locate both Tanzanian and overseas colleagues with the professional and personal knowledge, skills and behaviors to carry out the study.

4. Logistical and Financial Resources. The provision of certain facilities especially funding, transportation, housing, and supplies and materials on a timely basis are three principal assumptions underlying daily efforts.

5. Scheduling. Along with logistics, there are many other factors affecting the ability to keep the study on schedule. Amongst them are the following: top management support, participative involvement of all relevant organizations and individuals, access to data, ease of data extraction, group cohesion within the study team, lengths of interviews, travel times between interviews, interviewer receptivity to training, respondent cooperation, and so forth.

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FOOTNOTES

1. See, for example, papers emerging from last two International Congresses of the International Institutes of Administrative Science, Association of Schools and Institutes of Administration, Working Group on Public Sector Manpower and Education Planning, Congresses at Mexico City, 1974, and Abidjan, 1977, for dimensions of the issue.

2. See for example:

   Mende, J.J., Kilimo Manpower Development, Livestock Development Conference, 23-27 January, 1978, Dar Es Salaam.

   Maxwell, R., Agricultural Education in Tanzania - 1977, Ministry of Agriculture, Government of Tanzania (draft)

   Dowdy, L.C., G.F. Rankin, and R.C. Nelson and P.V. Armbrester, Program Proposal for A Department of Agricultural Education and Extension and A Center for Continuing Education in Agriculture at the Faculty of Agriculture and Forestry at Morogoro, Tanzania, West Virginia University and North Carolina Agricultural and Technical State University, Contract Report USAID/Afr. -C1067 I.P. No. 54 -- October 1975.

   Armbrester, P.V., and L.D. Lawrence, Report of the Ministry of Agriculture Curriculum Development Team, West Virginia University and North Carolina Agricultural and Technical State University, Contract USAID/Afr.-C-1067, Report No. 58, April, 1977.

3. See Kenya experience in:

   Richards, Lois, Telegram from Program Officer/Nairobi, to SECSTATE WASHDC UNCLAS NAIROBI 0477 of 11 January, 1978, titled Min Ag Studies - A Saga in Collaboration; which chronicles their experiences.

Appendix A-II: Questionnaires Utilized

[redacted]

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Sample Control No._____ Serial No._____

TANZANIA AGRICULTURAL MANPOWER SURVEY

OFFICE USE ONLY

Name of organisation_____

Region or division_____

District or section_____

Subsection_____

Location directions_____

_____

Mailing address_____

Appointment:
Date_____ Time_____

with_____
(name and/or title)

Telephone no._____ ( ) No telephone

Respondent_____
(title)

Interviewers_____

Recorder:_____

Interview date_____

Estimated total number of recent graduates (1976 or later)
in this subsection _____

Sample selection method used_____

_____

Number of completed forms actually
received from recent graduates_____

* *

PURPOSE OF INTERVIEW

As you know, the Tanzania Manpower Survey is a joint effort of Tanzanian and American experts. It is designed to provide the Ministry of Agriculture with information about the future demand for and supply of professional and technical agricultural personnel. By answering this questionnaire, you are contributing to the survey and using an opportunity to express your views to the Ministry. Your answers will be combined with those from other organisations for use in the report on this survey.

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TABLE NO. 1

Organisation: | Region or Division: | District or Section: | Sub-Section: | Parast Ag LS/Vet | Trg Res

Titles of Posts (If necessary, add titles on the blank lines)	Number of professional and technical posts as of 30 June 1979: How many - -							Were any of those posts filled by non-citizens? ( ) No ( ) Yes How many non-citizens in each post? (If yes) Which post?
	Established posts?	Vacant posts?	Filled posts?	Posts filled by educational levels				
				Cert.	Dipl.	B.Sc.	Other (specify)	
1	2	3	4	5	6	7	8	9
Senior Officers SPAC through AO III SPLC through LO III SPVC through VO II								
Field Officers PAFO through AFO III PFLO through LFO III								
AFA I and LFA I								
AFA II and LFA II								
Totals								

TABLE NO. 2

Organisation: | Region or Division: | District or Section: | Sub-Section: | Parast Ag LS/Vet | Trg Res

Do you have any non-citizens employed in professional or technical posts who were NOT included in establishment posts as of 30 June 1979?

( ) Yes — Please fill in the Table below ( ) No — Please skip to the next Table

For EACH non-citizen in a professional or technical post on 30 June 1979, please give Position Description (principle duties and skills)	What is the type of employment? (Tick Column 2 or 3, and if "aided", name source)			In which financial year is the non-citizen expected to leave the post (if known)?	Is a Tanzanian now in training as a replacement? (Tick)			If you need any additional posts to replace non-citizens not on establishment, what post titles?
	Gov't or company contract	Aided post	Aided by:		Yes	No	Don't Know	
1	2	3	4	5	6	7	8	9

TABLE NO. 3

Organisation: | Region or Division: | District or Section: | Sub-section: | Parast. Ag LS/Vet | Trg Res

Titles of Posts (If necessary, add titles on blank lines)	Number of actual or anticipated professional and technical staff changes from 1 July 1978 through 30 June 1979							Number of anticipated retirements of current professional or technical staff members from 1 July 1979 through June 1986
	Arrivals		Transfers	Attrition due to:				
	From Other Areas	New Allocations		Retirement	Death	Dismissal	Resignation	
1	2	3	4	5	6	7	8	9
Senior Officers SPAO through AO III SPLO through LO III SPVO through VO II								
Field Officers PAFO through AFO III PFLO through LFO III								
AFA I and LFA I								
AFA II and LFA II								
Totals								

SPECIALISATION/ASSIGNMENT LIST

CROPS

General agriculture
Crop breeding
Crop agronomy
Horticulture
Fruit
Vegetables
Vines
Flowers
Plant protection
Nematology
Virology
Pathology
Entomology

LIVESTOCK

Animal husbandry
Animal production or animal science
Ranch management
Range management
Pasture agronomy
Dip management
Tse-tse fly control
Dairy science
Poultry science
Artificial insemination

VETERINARY

Animal health
Anatomy
Physiology
Pharmacology/toxicology
Helminthology
Bacteriology
Mycology
Immunology
Pathology
Clinical pathology
Large animal surgery
Small animal surgery
Epidemiology

OTHER

Agro-mechanics
Agricultural engineering
Civil engineering
Mechanical engineering
Irrigation
Hydrology
Meat technology/processing
Food technology/processing
Food science and human nutrition
Biometry
Laboratory technology
Hides and skins
Agricultural education
Agricultural extension
Agricultural home economics
Agricultural economics
Livestock economics
Farm management
Marketing
Land use planning
Agricultural extension administration

Long term training (2 years or more)
Short term training (less than 2 years)
National service

Organisation:	Region or Division:	District or Section:	Sub-Section:	Parast Ag LS/Vet	6 Trg Res

TABLE NO. 4 What are the major specialisations in which your existing and newly allocated staff —

Specialisation (Please write in)	—will actually be working as of 30 June 1979, by educational level?				—have been trained, by educational level?			
	Cert	Dipl	B.Sc.	Other (specify)	Cert	Dipl	B.Sc.	Other (specify)
1	2	3	4	5	6	7	8	9

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Organisation:	Region or Division:	District or Section:	Sub-Section:	Parast Ag LS/Vet	Trg Res

Manpower Projection of Future Needs

The next few questions ask for your assessment of how many professional or technical staff members you believe you could use effectively in the next 7 years. But before proceeding with those questions, we would like to know more about some of the factors which you may take into account. For example,

1. What is your view of the agricultural potential of this area?

2. How many villages do you have now?

3. Do you expect to have more villages or more people in the next 7 years? (Please explain)

4. What is your situation with regard to coverage of villages by your professional and technical staff?

5. What activities, if any, currently in your area of responsibility do you think should be expanded or improved in the next 7 years?

6. Do you expect to start any new projects? (Please explain)

7. Is there anything else that might influence your professional and technical manpower needs in the next 7 years?

8. In the following tables, the next 7 years are divided into 3 survey time periods:

Survey Period A	2 years	July 1979 through June 1981
Survey Period B	2 years	July 1981 through June 1983
Survey Period C	3 years	July 1983 through June 1986

We want your professional assessment of how many more or how many fewer professional or technical staff members in various specialisations and educational levels you could use effectively in your area of responsibility, without concern for possible budget constraints or shortages of trained personnel. And we want to know only additional or fewer posts — not cumulative numbers of posts — in each time period.

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Organisation:	Region or Division:	District or Section:	Sub-Section:	8 Parast Ag LS/Vet	Trg Res

TABLE NO. 5a How many more (+) or how many fewer (-) staff members at each educational level with formal training in the specialisations you select do you think you could use effectively in the 3 survey time periods —

July 1979 to June 1981 (Survey Period A) compared to posts filled in June 1979

July 1981 to June 1983 (Survey Period B) compared to Survey Period A

July 1983 to June 1986 (Survey Period C) compared to Survey Period B

Educational level and specialisation (Please write in)	July 1979 through June 1981	July 1981 through June 1983	July 1983 through June 1986	Priority**
1	2	3	4	5
CERTIFICATE				
DIPLOMA				
B.SC.				

** Tick the one specialisation at each educational level to which the highest priority should be given.

THIS TABLE IS CONTINUED ON THE NEXT PAGE FOR HIGHER EDUCATIONAL LEVELS

Organisation:	Region or Division:	District or Section:	Sub-Section:	Parast Ag LS/Vet	Trg Res

TABLE NO. 5b How many more (+) or how many fewer (-) staff members at each educational level with formal training in the specialisations you select do you think you could use effective in the 3 survey time periods?

Educational level and specialisation (Please write in)	July 1979 through June 1981	July 1981 through June 1983	July 1983 through June 1986	Priority**
1	2	3	4	5
MASTERS OR POST GRAD DIPLOMA				
PH. D.				

** Tick the one specialisation at each educational level to which the highest priority should be given.

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Organisation: | Region or Division: | District or Section: | Sub-Section: | Parast Ag LS/Vet | Trg Res

TABLE NO. 6 How many persons on your staff at each educational level need either long term or short term training in which specific subject area? What length of time would you suggest for the training?

Specific subject areas in which training is needed	Certificate		Diploma		B. of Science		Other - specify	
	No. Who Need	Suggested Length	No. Who Need	Suggested Length	No. Who Need	Suggested Length	No. Who Need	Suggested Length
1	2	3	4	5	6	7	8	9
a. Long term training								
b. Short term training								

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Organisation:	Region or Division:	District or Section:	Sub-Section:	Parast A. LS/Vet	11 Trg Res

9. Have you supervised any personnel who graduated in 1976 or more recently at the Certificate, Diploma, or Bachelor of Science level?

( ) Yes ( ) No—please go to question 11.

10. We are interested in your opinion of the effectiveness of the training they received at the training institutions they attended. Please indicate by ticking the appropriate box how well you think the recent graduates (1976 or more recently) at each of the 3 education levels were trained in the following areas:

Areas	Very Well	Well	Ade-quately	Poorly
a. Theoretical knowledge—				
Certificate				
Diploma				
B.Science				
b. Ability to apply skills and knowledge practically—				
Certificate				
Diploma				
B. Science				
c. Ability to extend knowledge and skills to farmers—				
Certificate				
Diploma				
B. Science				
d. Administrative skills and knowledge—				
Certificate				
Diploma				
B. Science				

11. Do you have any suggestions for improving the training provided by MATIs at the:

a. Certificate level?

b. Diploma level?

12. Do you have any suggestions for improving the Bachelor of Science training at the University of Dar es Salaam, Morogoro?

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Organi-sation:	Region or District:	Division or Section:	Sub-Section:	Parast Ag LS/Vet	12 Trg Res

13. When was the last time you attended a refresher course or seminar?

( ) Never. Date: Month_____ and year_____

14. When was the last time you organised a refresher course or seminar?

( ) Never Date: Month_____ and year_____

15a. Do you have facilities (rooms, chairs, etc.) to conduct refresher courses or seminars?

( ) Yes ( ) No

15b. If you had no financial problems, could you or someone on your staff conduct such training?

( ) No ( ) Yes—15c. Who would do it?

16. What kind of training assistance would you like to have from KILIMO headquarters?

17. Do you think your staff need training in supervision?

( ) Yes ( ) No

18. Do you use staff meetings for training purposes?

( ) No ( ) Yes — How?

19. Have you instructed your supervisory staff to conduct on-the-job training for the personnel with whom they work?

( ) Yes ( ) No

20. How often are personnel placed in posts based on matching their specialised skills to the needs of the area served by your organisation?

( ) Usually ( ) Sometimes ( ) Rarely or never

21. When making assignments, how often is consideration given to matching the personal wishes of individuals with the available posts?

( ) Usually ( ) Sometimes ( ) Rarely or never

22. Do you believe that orientation training for new staff should be conducted?

( ) Yes ( ) No

23. Do you usually conduct orientation training for staff who are newly posted to your office or area of responsibility?

( ) Yes ( ) No

24. How long does it usually take for new staff members to become sufficiently knowledgeable to do their jobs with confidence?

Number of months_____ or years _____

25. When did your last transfer take place

Date: Month_____ and year_____ ( ) Never transferred—Please go to question 27

26. Was your last transfer initiated by—

( ) Your own request, or
( ) Orders from your superior officers?

27. In order to do an effective job, what is the minimum length of time you believe a person should work in this area?

Number of months_____ or years_____

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Organi-sation:	Region or District:	Division or Section:	Sub-Section:	Parast Ag LS/Vet	13 Trg Res

28. Does your staff usually work in this area that long?

( ) Yes ( ) No

29. At which levels are too frequent transfers a problem? (Tick as many as appropriate)

( ) Professional ( ) Diplomate ( ) Certificate ( ) None

30. What are the main reasons for too frequent transfers?

31. Do your superior officers consult sufficiently with you before they make important administrative or technical decisions?

( ) Usually ( ) Sometimes ( ) Rarely or never

32. Do you have a copy of any of the last 4 issues of Ukulima wa Kisasa in your office or home?

( ) Yes ( ) No

33. Do you have a copy of any of the last 4 issues of the East African Agricultural and Forestry Journal in your office or home?

( ) Yes ( ) No

34. Approximately how many communications of technical information from research centres have been received by your office this financial year?

Number_____

35. Has enough technical information been received from KILIMO Headquarters Division for extension purposes during this financial year?

( ) Yes ( ) No

36. In your daily work, what are the main sources of technical information you use?

37. Are research findings available in forms appropriate for technical level personnel to communicate effective with farmers?

( ) Yes ( ) No

38. When was the last time you discussed technical information with a staff member of a research centre?

Date: Month_____ and year_____ ( ) Never

39. From what other sources do you receive technical information?

40. What have you found to be the most effective ways of motivating staff to do their best work?

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Organi-sation:	Region or District:	Division or Section:	Sub-Section:	Parast. Ag LS/Vet	Trg Res

41. Do you use periodic work schedules in your supervision of subordinates/ work programmes?

( ) Yes ( ) No---Please go to question 43

42. What problems are there in implementing work schedules?

43. How do you find out whether your staff have been carrying out their work or not?

44. What help is given to staff who are not performing satisfactorily?

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Organi-sation:	Region or District:	Division or Section:	Sub-Section:	Parast Ag LS/Vet	15 Trg Res

45. What are the major administrative coordination problems, if any, which exist between—

a. PMO and KILIMO Headquarters Divisions?

b. PMO and KILIMO regional offices?

c. KILIMO Headquarters Divisions and KILIMO regional offices?

d. KILIMO regional offices and parastatals?

e. KILIMO regional offices and KILIMO district offices?

f. KILIMO district offices and village level staff?

g. Other organisations? (Please specify)

46. Before preparing your annual agricultural sector plan, do you meet with your staff to discuss what should be included?

( ) Usually ( ) Sometimes ( ) Rarely or never

47. Please explain your answer to question 46.

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Organisation:	Region or District:	Division or Section:	Sub-Section:	Parast. Ag LS/Vet	Trg Res

48. Please rate the adequacy of your recurrent and capital estimates for the following items:

Items	Adequate	Borderline	Inadequate
1	2	3	4
a. Vehicle			
b. Transport - fuel, oil, etc.			
c. Vehicle maintenance and repair			
d. Travelling allowance			
e. Equipment and supplies			
f. Training - short courses and seminars			
g. Telephones and telegrams			
h. Upkeep of stations, buildings			
i. Clerical assistance			
j.			
k.			
l.			

49. In which month or months of the year do you experience significant shortages of funds for your work?

Specify months_____

50. How many months out of a year are your staff unable to carry out their duties, due to shortages of funds for petrol, vehicles, equipment, allowance, or other items?

Number of months_____

51. How often is your organisation's work adversely affected by the following:

Items	Not at all	Occasionally	Frequently	Very frequently
1	2	3	4	5
a. Delays in issuing warrants of funds				
b. Adequacy of quarterly allocations (cash flow)				
c. Accounting regulations cause delays				
d. Quarterly financial report submissions are late				
e. Difficulty in obtaining supplementary funds				
f. Travel to Headquarters to clear up confusion wastes time				
g. Delays in obtaining safari imprest funds				
h. Delays in obtaining travel warrants				
i. Efficiency of accounting				
j. Delays in receiving supplies				
k.				
l.				
m.				

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TANZANIA AGRICULTURAL MANPOWER STUDY April '79

Questionnaire for Teachers

(Self-administered)

The Agricultural Manpower Study is a joint effort of Tanzanian and external experts, designed to advise the Ministry of Agriculture Manpower Development Division regarding future supply of and demand for trained agriculturalists. In addition, recommendations are to be made to DMD for improving the quality of agricultural education in supplier institutions. By answering the questions which follow, you will be contributing to the study and using an opportunity to express your views to DMD. Your response will be completely confidential, appearing only in collective form. By not placing your name on the form, we hope you will be completely frank and open in your information. Thank you very much for your cooperation and assistance.

Instructions: Please be very brief and precise in answering open questions. Where multiple choices are offered, tick (✓) the one best response. Add very brief comments any time they are necessary to explain your answers more fully.

Name of School _____

1. What percentage of your time is spent in actual theory and practicals teaching activities?

   0 - 19% _____
   20 - 39% _____
   40 - 59% _____
   60 - 79% _____
   80 - 100% _____

2. What are the most important problems that most limit the quality of your teaching (theory and practicals)?

3. Can you suggest solutions for each of the problems mentioned in question 2 above?

4. In theory teaching, do you use teaching methods other than lecture?

   Yes _____ No _____

   If you ticked yes, what are the teaching methods and how much are they used (in percentage of time)?

   _____ %
   _____ %
   _____ %
   _____ %

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5. When you develop your notes for theory classes, what percentage comes from each of the following sources?

Notes from your own previous coursework	____%
Notes taken from reference books	____%
KILIMO written materials	____%
Personal knowledge	____%
Other (explain)_____	____%
Total	100 %

6. If a "tutor's guide" were prepared for your subject matter area by a committee of experts and topic tutors, which could be used in all institutes, this would be:

Very useful to me _____
Somewhat useful to me _____
Probably not used by me _____

7. Would you like to have time to prepare a "tutor's guide" for yourself?

Yes _____
No _____

8. How can theory teaching be improved at this MATI?

9. How can practicals best be improved at this MATI?

10. On the average, are the certificate students you teach:

Very good academically _____
Good academically _____
Fair academically _____
Poor academically _____
Very poor academically _____

Where there is poor academic performance, please describe:

11. The exchange of information between staff and administration within your MATI is:

Very good _____
Good _____
Fair _____
Poor _____

12. How can the exchange of information be improved?

13. How many times in the last 12 months have you contacted the following people in order to obtain or exchange agricultural information?

Agricultural officers	_____ times
Researchers	_____ times
Persons having Tanzanian printed matter	_____ times
Village Manager or Bwana Shamba	_____ times
Others (list)_____	_____ times

14. List the duties, as you understand them, of a village level field worker (Bwana Shamba):

15. How much do you like teaching?

Very much _____
Somewhat _____
Not very much _____
Not at all _____

16. Would you rather teach elsewhere? Yes _____ No _____

If you ticked yes, please tick important reasons why:

( ) a. I have been here for many years;
( ) b. Poor institutional administration;
( ) c. My family is in another region;
( ) d. I don't relate well with the staff;
( ) e. I am overworked here;
( ) f. Other (list)_____

17. Would you prefer to be assigned agricultural duties rather than teaching?

Yes _____ No _____

If you ticked yes, please tick important reasons why:

( ) a. I am not interested in teaching;
( ) b. I am poorly prepared for teaching;
( ) c. Health reasons;
( ) d. I am overworked as a teacher;
( ) e. Other (list)_____ _____

18. Are you teaching some or all of your classes in your area of specialization?

Yes _____ No _____

19. Are you teaching in areas for which you were not prepared: Yes _____ No _____
If you are teaching outside of your areas of preparation, tick as many of the reasons why as apply:

( ) a. There are not enough staff here;
( ) b. There are no qualified staff in those areas;
( ) c. I am interested in the field;
( ) d. The administration is not aware of my lack of preparation;
( ) e. Other (list)_____

20. How adequate was your orientation when you first joined this institution?

Very adequate _____
Partially adequate_____
None given _____

21. What Short Courses have you taken? How useful were they?

Title of Course	Length in weeks	Usefulness: Very	Some	None
_____	_____	___	___	___
_____	_____	___	___	___
_____	_____	___	___	___
_____	_____	___	___	___
_____	_____	___	___	___

22. What Short Courses do you now feel would enable you to teach your topics better?

23. Please tick the positions in which you have previously served:

( ) a. Administration - Ministerial Level
( ) b. Administration - Regional Level
( ) c. Administration - District Level
( ) d. Researcher
( ) e. Seconded to Parastatals
( ) f. Seconded to other Ministries
( ) g. Extension Service
( ) h. Other (list)_____

24. Your highest completed level of education: Certificate _____
Diploma _____
Bachelor _____
Master _____
Ph.D. _____

TANZANIA AGRICULTURAL MANPOWER STUDY April '79

Student Questionnaire

Name of MATI _____ (Do not put your name on this form.)

Are you: A Certificate student_____ A Diploma student_____

Male_____ Female_____

How many years of field experience have you had? _____

One of the purposes of the present manpower study is to find ways to improve the quality of education in the Institutes. You can help by giving your frank opinion in answering the following questions. Your answers will be combined with all others for use in the final report.

INSTRUCTIONS

For multiple-choice questions, place a tick (✓) beside the one response which best indicates your opinion. We will also be interested in any brief comments you may care to make.

1. After secondary school, was Agriculture your:

   First choice? _____

   Second choice? _____

   Third choice _____

   Other (please explain) _____

2. (a) What are the major problems you are facing as a student?

   (b) What do you think should be done to reduce these problems?

3. Tick (✓) one response for each of the following aspects of the Institute's operation:

	Good	Fair	Poor
Availability to you of library resources	___	___	___
Access to the library at convenient hours	___	___	___
Availability to you of pencils, paper, etc.	___	___	___
Availability of necessary equepment and supplies for practicals	___	___	___
Availability of land, livestock and water	___	___	___
Adequacy of study time	___	___	___
The conscientiousness of tutors in meeting their classes and practicals	___	___	___

4. In general, how well do your tutors know their subjects?

   Most know them very well _____
   Some know them very well _____
   Few know them very well _____

5. In general, how well do your tutors teach (1) theory classes and (2) practical classes?

	Theory	Practicals
Most teach very well	_____	_____
Some teach very well	_____	_____
Few teach very well	_____	_____

6. Is the relationship between staff and students in this school generally:

   Very good? _____
   Good? _____
   Fair _____
   Poor _____

ANSWER QUESTIONS 7a and 7b ONLY IF YOU ARE A CERTIFICATE STUDENT WITH AG-BIASED SECONDARY SCHOOL EXPERIENCE.

7. a. How would you rate the quality of the training in the ag-biased secondary school you attended?

   Very good _____
   Good _____
   Fair _____
   Poor _____

   b. How much of your Certificate coursework has been unnecessary repetition of secondary school courses?

   Most of it _____
   A lot of it _____
   Some of it _____
   Little or none of it _____

ANSWER QUESTION 8 ONLY IF YOU ARE AN IN-SERVICE DIPLOMA STUDENT.

8. How much of your Diploma coursework has been unnecessary repetition of Certificate courses?

   Most of it _____
   A lot of it _____
   Some of it _____
   Little or none of it _____

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SUPERVISORY MANAGERS' VIEWS OF EDUCATION AND STAFF PERFORMANCE

Please evaluate to the best of your ability how well your agricultural staff at each educational level perform or exhibit the following knowledges, skills and attitudes. We are interested in (a) the performance of freshly allocated personnel (graduation 1976 or more recently) to measure the effectiveness of their training at educational institutions; and (2) the performance of ALL OTHER agricultural staff at certificate level and above to determine possible additional training needs.

	Freshly Allocated Personnel				All Other Agricultural Staff			
	Very Well	Well	Ade-quately	Poorly	Very Well	Well	Ade-quately	Poorly
1) In theoretical knowledge:								
Certificate staff								
Diploma staff								
B.Sc.Morogoro								
B.Sc. external or BVM								
Post-grad Morogoro								
Post-grad external								
2) In ability to apply skills and knowledge practically:								
Certificate staff								
Diploma staff								
B.Sc.Morogoro								
B.Sc. external								
Post-grad Morogoro								
Post-grad external								
3) In values, habits and attitudes which are conducive to productive work:								
Certificate staff								
Diploma staff								
B.Sc.Morogoro								
B.Sc. external								
Post-grad Morogoro								
Post-grad external								
4) In administrative skills and knowledge (in general):								
Certificate staff								
Diploma staff								
B.Sc.Morogoro								
B.Sc.external								
Post-grad Morogoro								
Post-grad external								
5) In planning skills:								
Certificate staff								
Diploma staff								
B.Sc.Morogoro								
B.Sc.external								

	Freshly Allocated Personnel				All Other Agricultural Staff			
	Very Well	Well	Ade-quately	Poorly	Very Well	Well	Ade-quately	Poorly
5) continued								
Post-grad Morogoro								
Post-grad external								
6) In knowledge and skills of super-vision and manage-ment:								
Certificate staff								
Diploma staff								
B.Sc.Morogoro								
B.Sc. external								
Post-grad Morogoro								
Post-grad external								
7) In ability to ex-tend knowledge and skills to farmers?								
Certificate staff								
Diploma staff								
B.Sc.Morogoro								
B.Sc. external								
Post-grad Morogoro								
Post-grad external								
8) In knowledge and ability to apply economic principles:								
Certificate staff								
Diploma staff								
B.Sc.Morogoro								
B.Sc. external								
Post-grad Morogoro								
Post-grad external								
TOTALS								

OVERALL EVALUATION OF ALL STAFF AT EACH EDUCATIONAL LEVEL

	Extremely Good	Good	Adequate	Not Adequate	Extremely Poor
Certificate holders					
Diploma holders					
Morogoro B.Sc.s					
External B.Sc.s					

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SUPERVISORY MANAGERS' VIEWS OF EDUCATIONAL AND STAFF PERFORMANCE

20th April, 1979.

Interview questions:

A. Questions regarding newly allocated staff (graduated in 1975 or more recently).

1. What suggestions do you have to improve the training provided by MATIs at the:
   a) Certificate level
   b) Diploma level
   c) Overall suggestions

2. What suggestions do you have for improving the training of B.Sc. level at the University of Dar es Salaam, Morogoro?

3. What are your views regarding the rold of UDSM, Morogoro in the training of:
   a) B.Sc. students
   b) Other agricultural employees (as in the Continuing education programme at the University)?

4. Under what circumstances should personnel be sent to foreign universities for training?

5. When a newly allocated employee arrives, do you provide him with orientation to the organisation and his job? How is this done?

6. What approach do you take in guiding or assisting him during the first year on the job?

7. When a new employee exhibits serious weakness in his knowledge skills or attitudes, how do you seek to correct the situation?

B. Questions regarding all other staff on speciality and training needs.

1. What do you see as the most important problems in meeting your speciality and technical training needs?

2. What short-term seminars or courses are best given by a training or educational [illegible]? What training and educational institutes should be used? (Refer to needs on short-term training needs).

3. If these training and educational institutes cannot adequately meet this need, what do you propose as an alternative approach?

4. Can your organisation provide any of this training? Have you ever given such programmes? How successful were they, and what were the problems? Do you have physical facilities for training programmes (rooms, tables, chairs, blackboard, etc.)?

5. Have any of your staff had training in training methods and techniques? Would such training be useful in helping them to meet your training needs? (Training the trainer techniques).

6. To what extent do your speciality staff train and develop other staff? Do you see training as one of their responsibilities? How do expatriate specialists help?

7. What kind of training assistance do you expect from KILIMO?

8. How do your supervisory or speciality staff carry out training of staff on-the-job?

9. Have any of your staff received specific training on techniques such as how to train, guide, counsel and coach subordinate personnel on the job?

10. Do any of your staff require foreign training?

11. How many of your present certificate level staff do you plan to send to MATIs for diploma level training? How do you select such staff?

12. Do you plan to recommend any diploma level staff for B.Sc. training? How many? How do you select them?

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C. Questions regarding all other staff on other types of training.

1. What programme do you have to [redacted] train supervisors and managers?

2. What educational or training institutes do you use to train supervisors and managers? How do you rate their programmes?

3. What suggestions do you have to improve supervisory and management training?

4. Do you use staff meetings for training purposes? How?

5. How is staff prepared for higher level responsibilities?

6. How do you meet your other training needs (other than speciality and supervisory management needs)?

____oOo____

[redacted]

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TANZANIA AGRICULTURAL MANPOWER STUDY

RECENT GRADUATE TRAINING EVALUATION

One of the purposes of the present manpower study is to find ways to improve the quality of education in the Institutes. You can help by giving your frank opinion in answering the following questions. Your answers will be combined with all others for use in the final report. This questionnaire is confidential; please do not put your name on it.

INSTRUCTIONS

For multiple-choice questions, place a tick ( ) beside the one response which best indicates your opinion. We will also be interested in any brief comments you may care to make.

1. Please indicate the location of your present posting:

   _____Ministry Hqrs _____Regional Office _____District Office

   _____Village _____Parastatal Sector _____ Private Sector _____Research

2. Highest level of education completed:

   _____Certificate _____Diploma _____B.Sc.

3. General field of study: _____Crops _____Livestock _____Both

4. Please evaluate the quality of your most recent (Certificate/Diploma/B.Sc.) training by placing a tick under the appropriate column, with regard to:

	Very Well Trained	Well Trained	Adequately Trained	Poorly Trained	Very Poorly Trained
a) Theoretical knowledge:					
b) Ability to apply skills & knowledge practically:					
c) Values, habits & attitudes which are conducive to productive work:					
d) Administrative skills & knowledge:					
e) Planning skills:					
f) Knowledge and skills of supervision & management:					
g) Ability to extend knowledge and skills to farmers:					
h) Knowledge & ability to apply economic principles:					

15. a) Was your work performance affected by those areas in which you may have been poorly trained? _____Yes _____No

    b) If yes, please give specific examples:

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6. How have you overcome any weaknesses in training?

7. In which subject areas, if any, were you poorly trained? (If none, write "none".)

8. How do you think your training could be improved?

9. Based on your recent job experiences, please indicate your opinion regarding changes in emphases needed in training by placing a tick in the appropriate column:

Theory and Practicals	Much More	Some More	About the Same	Some Less	Much Less
a) Crop Science					
b) Horticulture					
c) Soil Science					
d) Surveying					
e) Forestry					
f) Bees & fisheries					
g) Workshop technology					
h) Oxen power					
i) Anatomy & physiology					
j) Animal improvement					
k) Phys. of growth lact eggs					
l) Animal nutrition					
m) Poultry husbandry					
n) Beef husbandry					
o) Farm economic org.					
p) Agric. extension					
q) Administration & legislation					
r) Human nutrition					
s) Soil conservation					
t) Small scale irrigation					
u) Tractor power					
v) Other farm power					
w) Dairy husbandry					
x) Path., micro., proto, & (para					
y) Major livestock diseases					
z) Poultry diseases					
aa) Clinical studies					
bb) Animal industry (meat insp)					
cc) Range & pasture mgt.					
dd) Pol.Ed. and Pol. Econ.					
ee) Farm structures					

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Appendix A-III: COMPUTER PRINT-OUTS

(Separate Volumes - Maintained
by Manpower Development Division,
Ministry of Agriculture)

Appendix A-IV: SECONDARY SCHOOL ENROLLMENTS

REPUBLIC OF TANZANIA

SEVENTH EDUCATION PROJECT

Projection of Public and Private Secondary School Enrollments 1977-1990

(a) Public Secondary Schools

	1977 1/	1978 1/	1979 b/	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Form I	9,242	8,797	8,855	8,995	9,240	9,240	9,660	9,660	9,660	9,977	9,977	9,977	9,977	9,977
Form II	9,548	9,790	8,925	8,855	8,995	9,240	9,240	9,660	9,660	9,660	9,977	9,977	9,977	9,977
Form III	9,755	9,703	9,790	8,925	8,855	8,995	9,240	9,240	9,660	9,660	9,660	9,977	9,977	9,977
Form IV	9,338	9,852	9,703	9,790	8,925	8,855	8,995	9,240	9,240	9,660	9,660	9,660	9,977	9,977
Total	37,883	37,872	37,273	36,565	36,015	36,330	37,135	37,800	38,220	38,957	39,274	39,591	39,908	39,908
Form V	2,125	1,902	2,050	2,050	2,050	2,100	2,100	2,100	2,625	3,150	3,150	3,150	3,150	3,150
Form VI	1,962	2,018	2,050	2,050	2,050	2,100	2,100	2,100	2,100	2,625	3,150	3,150	3,150	3,150
Total	4,087	4,100	4,100	4,100	4,100	4,200	4,200	4,200	4,725	5,775	6,300	6,300	6,300	6,300
I - VI	41,970	39,774	41,373	40,665	40,115	40,530	41,335	42,000	42,945	44,732	45,574	45,891	46,208	46,208

1/ 1977, 1978 figures were actuals

b/ Data for 1979 and projections for 1980 onwards assume 35 pupils per stream and static progression from one class to another for Form I-IV; Forms V and VI assume 25 pupils per stream. The number of streams is derived from Government Development Plans.

TABLE 11
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REPUBLIC OF TANZANIA

SEVENTH EDUCATION PROJECT

(b) Projected Enrollment (Private Secondary Schools)

	1977 2/	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Form I	6,590	6,839	7,454	8,125	8,856	9,653	10,522	11,469	12,501	13,627	14,853	16,190	7,647	19,235
Form II	5,084	5,564	6,839	7,230.	7,881	8,590	9,363	10,206	11,125	12,126	13,218	14,407	15,704	17,118
Form III	3,829	4,783	5,564	6,839	7,230	7,881	8,590	9,363	10,206	11,125	12,126	13,218	14,407	15,704
Form IV	3,316	4,003	4,783	5,564	6,839	7,230	7,881	8,590	9,363	10,206	1,125	12,126	13,218	14,407
Total	19,213	21,189	24,640	22,194	30,806	33,354	36,355	39,628	43,195	47,084	51,322	55,941	60,976	66,464
Form V	154	154	154	154	154	154	154	154	154	154	154	154	154	154
Form VI	106	106	106	106	106	106	106	106	106	106	106	106	106	106
Total	260	260	260	260	260	260	260	260	260	260	260	260	260	260
I - VI	19,473	21,449	24,900	22,454	31,066	33,614	36,615	39,888	43,455	47,324	51,582	56,201	61,236	66,724

2/ Actuals.

Notes: The 2/ Actuals - Manpower Report to President, 1977.
During 1973-76, private schools grew at the rate of 10.9%. Forms I-IV grew at 11.25% and Forms V-VI at 6% per annum. The growth trends of Form I intake were at an average annual rate of 9.5% during 1973-74 and 12.6% over 1975-76. During that period there was considerable transfer at Forms II-IV from private to Government schools. The new Government education policy stopping transfer from private schools into Government schools now means that private schools would have to retain most of their initial intake. Taking this into consideration, the following assumptions were made:
- a 9% per annum growth rate in private Form I intake
- a 3% attrition rate from Form I to Form II and 0% for Form II to III and III to IV
- Forms V and VI were assumed to remain at 1977 level

TABLE 13

GRADE DISTRIBUTION FOR FORM SIX SUBJECTS - 1977

SCHOOL CANDIDATES

SUBJECT	GRADE RANGE, NUMBER AND PERCENTAGE OF CANDIDATES AWARDED														TOTAL	RELATIVE VARIATION	ORDER OF PERFORMANCE
	A		B		C		D		E		S		F				
	NO	%	NO	%	NO	%	NO	%	NO	%	NO	%	NO	%			
SIASA	0	0.0	41	2.1	401	20.8	411	21.3	758	39.3	226	11.7	93	4.8	1930	18.0	5
KISWAHILI	2	0.9	19	9.1	66	31.6	63	30.1	36	17.2	16	7.7	7	3.3	209	26.5	12
LITERATURE IN ENGLISH	1	0.5	2	1.0	35	17.9	57	29.2	64	32.8	17	8.7	19	9.7	195	17.6	4
FRENCH	3	7.7	4	10.2	3	7.7	6	15.4	9	23.1	9	23.1	5	12.8	39	25.0	11
HISTORY	3	0.6	17	3.6	71	14.8	108	22.6	139	29.0	84	17.5	57	11.9	479	17.0	3
GEOGRAPHY	0	0.0	3	0.4	46	5.4	170	19.8	325	37.8	197	22.9	118	13.7	859	22.4	9
ECONOMICS	5	1.6	15	4.7	49	15.3	111	34.7	80	25.0	36	11.2	24	7.5	320	18.8	6
COMMERCE	3	6.5	3	6.5	20	43.5	10	21.7	9	19.0	1	2.2	0	0.0	46	11.2	2
ACCOUNTANCY	5	10.9	1	2.2	8	17.4	9	19.6	13	28.3	6	13.0	4	8.7	46	19.4	7
ADVANCED MATHEMATICS	19	2.7	38	5.3	86	12.0	123	17.2	107	14.9	145	20.2	198	27.7	716	30.1	14
TRADITIONAL MATHS	1	7.1	0	0.0	1	7.1	1	7.1	1	7.1	5	35.7	5	35.7	14	62.3	15
PHYSICS	20	1.8	62	5.7	112	10.3	128	11.8	210	19.4	271	25.0	282	26.0	1085	27.7	13
CHEMISTRY	3	0.3	16	1.4	66	5.7	169	14.7	204	17.8	276	24.0	415	36.1	1149	23.9	10
BIOLOGY	4	0.6	21	3.2	113	17.0	194	29.2	198	29.8	61	9.2	74	11.1	665	20.2	8
BASIC APPLIED MATHS Sub	-	-	-	-	-	-	-	-	-	-	355	39.8	536	60.2	891	48.7	-
TRAD. SUB. MATHS																	
MILITARY SCIENCE	3	4.6	13	19.7	19	28.8	20	30.3	11	16.6	0	0.0	0	0.0	66	10.8	1
DIVINITY	0	0.0	0	0.0	0	0.0	1	100.0	0	0.0	0	0.0	0	0.0	1	-	-

TABLE 11

DISTRIBUTION OF GRADES FOR FORM FOUR SUBJECTS - 1977 (SCHOOL CANDIDATES)

SUBJECTS	GRADE RANGE, NUMBER AND PERCENTAGE OF CANDIDATES AWARDED										TOTAL	RELATIVE VARIATION	ORDER OF PERFORMANCE
	A		B		C		D		F				
	NO	%	NO	%	NO	%	NO	%	NO	%			
SIASA	1	0.01	278	2.2	3437	26.6	6111	47.4	3070	23.8	12897	23.9	3
KISWAHILI	5	0.04	359	2.8	4739	36.7	4814	37.3	2982	23.1	12899	25.0	5
ENGLISH	43	0.3	766	5.9	2598	20.1	4418	34.2	5096	39.4	12921	35.9	15
HISTORY	126	1.1	612	5.4	2691	23.9	3879	34.5	3951	35.1	11259	32.4	11
GEOGRAPHY	32	0.3	545	4.5	2225	18.4	5048	41.6	4266	35.2	12116	34.0	13
MODERN MATHEMATICS	31	0.3	188	1.8	1209	11.9	3894	38.2	4875	47.8	10197	40.6	20
TRAD. MATHEMATICS	25	1.0	128	5.1	259	10.2	651	25.7	1467	58.0	2530	59.7	30
BIOLOGY	86	0.7	820	7.1	2871	24.8	3100	26.8	4693	40.6	11570	37.5	16
FRENCH	11	3.1	66	18.3	112	31.1	87	24.2	84	23.3	360	39.3	19
LITERATURE IN ENGLISH	8	0.7	40	3.8	169	15.9	214	20.2	630	59.4	1061	47.1	23
MODERN ADD. MATHS	5	0.5	88	8.3	190	17.8	329	30.8	455	42.6	1067	39.3	19
TRAD. ADD. MATHS	0	0.0	9	2.0	29	6.3	60	13.1	359	78.6	457	53.0	29

TABLE 11

DISTRIBUTION OF GRADES FOR FORM FOUR SUBJECTS - 1977

SCHOOL CANDIDATES

SUBJECTS	GRADE RANGE, NUMBER AND PERCENTAGE OF CANDIDATES AWARDED										TOTAL	RELATIVE VARIATION	ORDER OF PERFORMANCE
	A		B		C		D		E				
	NO	%	NO	%	NO	%	NO	%	NO	%			
BIBLE KNOWLEDGE	36	4.9	94	12.8	177	24.0	180	24.5	249	33.8	736	51.8	27
PHYSICS	28	0.4	178	29	828	13.6	1759	28.8	3313	54.3	6106	38.2	17
CHEMISTRY	17	0.3	182	2.6	855	12.4	1898	27.4	3963	57.3	6915	38.6	18
AGRICULTURAL SCIENCE	18	0.5	472	13.8	1932	56.3	767	22.4	242	7.0	3431	20.1	1
MILITARY SCIENCE													
NATIONAL & BUS. ECON.	9	0.4	186	9.1	475	23.3	423	20.8	942	46.3	2035	43.0	21
PRINCIPLES OF ACCOUNTS	22	0.9	152	6.4	312	13.2	468	19.7	1417	59.8	2371	51.9	28
TYPEWRITING	0	0.0	1	0.3	5	1.5	5	1.5	318	96.7	329	-	-
COOKERY	17	2.6	105	16.0	251	38.3	202	30.7	81	12.4	656	25.0	5
FINE ART	14	3.8	34	9.3	64	17.5	88	24.0	166	45.4	366	48.1	25
NEEDLEWORK/DRESSMAKING	17	3.6	42	8.9	186	39.2	163	34.4	66	13.9	474	26.1	6
ENGINEERING SCIENCE	16	2.6	44	7.0	112	17.9	127	20.4	325	52.1	624	47.7	24
BUILDING CONST & DRAW.	15	4.9	43	14.0	88	28.7	95	30.9	66	21.5	307	31.6	10

TABLE 1:

SUBJECTS	GRADE RANGE, NUMBER AND PERCENTAGE OF CANDIDATES AWARDED										TOTAL	RELATIVE VARIATION	ORDER OF PERFORMANCE
	A		B		C		D		F				
	NO	%	NO	%	NO	%	NO	%	NO	%			
SURVEYING	5	1.6	31	10.1	74	24.2	100	32.7	96	31.4	306	34.6	14
WOODWORK & PAINTING	3	1.8	15	9.0	64	38.6	56	33.7	28	16.9	166	27.1	8
BLOCKWORK & PLUMBING	0	0.0	28	19.9	36	25.5	55	39.0	22	15.6	141	22.8	2
ELECT. INST. TECHNOLOGY	14	11.4	30	24.4	40	32.5	29	23.6	10	8.1	123	26.3	7
AUTOELECTR/ELECTR/&R.R.	6	4.9	31	25.2	24	19.5	41	33.3	21	17.1	123	29.5	9
GEOM & MECH. DRAWING	13	4.1	16	5.1	68	21.5	58	18.4	161	50.9	316	50.4	26
MECCH. WORKSHOP TECH.	12	6.2	35	18.1	55	28.5	81	21.2	50	25.9	193	45.2	22
MOTOR VEHICLE MECH.	1	1.0	7	7.4	47	49.5	26	27.4	14	14.7	95	-	-
WELDING & FABRICATION	2	2.0	28	29.2	39	40.6	21	21.9	6	6.3	96	24.1	4
ISLAMIC KNOWLEDGE	12	3.2	46	12.2	152	40.2	79	20.9	89	23.5	378	33.2	12

Appendix A-V: BUDGET CONSTRAINT DETAILS AND FINANCIAL IMPACTS CALCULATION

APPENDIX A-V

Budget Constraint Details and Financial Impacts Calculation

Notes from Discussions at Ministry of Finance and Planning, Recurrent Budgets and Revenues Section: (October 1979)

1. Issue of Use of Establishment Figures As Sound Basis for Constraint Setting.

Agreed with basic concepts underlying the establishment approach. Believed that increased costs on recurrent account could be financed, even at higher levels.

2. Inflationary Impacts on Recurrent Cost

Present inflationary rate was 17 percent. Revenues have increased at a faster rate than inflation, and will likely do so infuture. War expenses expected to be made up within three years, and then expenses will be back to "normal." There will likely be a temporary restriction on recurrent costs. This is under study now.

3. Salary Increases

Recognized that cost of living has gone up by 74 percent in six years. This is public information. There is no way of knowing what rate of increase in salaries will occur. The provision of 3% per year is acceptable as within the realm of possibility.

4. Summary

Basic approach taken in report appears sound and reasonable.

Appendix A-VI: OTHER PERSONS INTERVIEWED

Other Persons Interviewed

In addition to the more than 300 persons interviewed in the course of the survey and study, other individuals from various donor institutions and elsewhere also contributed their observations to assist the effort. These included:

de Vries, J., Faculty of Agriculture, University of Dar Es Salaam
Edgerton, J., Central Projects, Rural Development, World Bank
Frankel, J., East Africa Projects, World Bank
Jones, H., Agriculture and Rural Development Division, Africa Bureau, AID
Kyejo, Commissioner for Recurrent Budgets, Ministry of Finance and Planning
Lele, U., East Africa Projects, World Bank
Linthard, Architect, Ministry of Education
Maas, J. van, Education Division, World Bank
Mabele, Head, Economics Department, University of Dar Es Salaam
Makenya, Commissioner for Revenues, Ministry of Finance and Planning
McDermott, J. K., Development Support Bureau-Agriculture, AID
Mercer, A., Central Projects, Rural Development, World Bank
Morris, J., Department of Rural Sociology, Utah State University
Nelson, R., Regional Office, World Bank (Nairobi)
Schultheiss, M., Lecturer, Department of Economics, University of Dar Es Salaam

Appendix A-VII: BIBLIOGRAPHY

APPENDIX A-VII

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Appendix A-VIII: QUESTIONNAIRE RESPONSES - UTILIZATION

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APPFNDIX A-VIII

Questionnaire Responses - Utilization:

Tallies of 177 Regional and District Questionnaires

Organi-sation:	Region or District:	Division or Section:	Sub-Section:	Parast Ag LS/Vet	12 Trg Res

No Answer

13. When was the last time you attended a refresher course or seminar?
(67) Never Date: Month Yes 105 and year _____ 5

14. When was the last time you organised a refresher course or seminar?
(67) Never Date: Month Yes 105 and year _____ 5

15a. Do you have facilities (rooms, chairs, etc.) to conduct refresher courses or seminars?
(76) Yes (96) No 5

15b. If you had no financial problems, could you or someone on your staff conduct such training?
(10) No (160) Yes—15c. Who would do it? 7

16. What kind of training assistance would you like to have from KILIMO headquarters?

17. Do you think your staff need training in supervision?
(157) Yes (15) No 5

18. Do you use staff meetings for training purposes?
(46) No (125) Yes — How? 6

19. Have you instructed your supervisory staff to conduct on-the-job training for the personnel with whom they work?
(139) Yes (33) No 5

20. How often are personnel placed in posts based on matching their specialised skills to the needs of the area served by your organisation?
(87) Usually (64) Sometimes (20) Rarely or never 6

21. When making assignments, how often is consideration given to matching the personal wishes of individuals with the available posts?
(55) Usually (75) Sometimes (42) Rarely or never 5

22. Do you believe that orientation training for new staff should be conducted?
(166) Yes (5) No 6

23. Do you usually conduct orientation training for staff who are newly posted to your office or area of responsibility?
(104) Yes (67) No 6

24. How long does it usually take for new staff members to become sufficiently knowledgeable to do their jobs with confidence?
Less than 12 mths = 74 1to2 years = 89 More than 2 years = 8
Number of months _____ or years _____ 5

25. When did your last transfer take place
Date: Month Yes 149 and year _____ (22) Never transferred—Please to to question 27 5

See Text (Chapter VIII-J) and (Chapter III-B)

26. Was your last transfer initiated by—
(20) Your own request, or
(129) Orders from your superior officers? 27

27. In order to do an effective job, what is the minimum length of time you believe a person should work in this area?
Number of months _____ or years _____ See text (Chapter VIII-J)

1yr.	2yrs.	3yrs.	4yrs.	5yrs.	6+yrs.	10	
5-2.9%	22-12.6%	78-44.6%	16-9.1%	50-28.6%	1-.05%	3-.1%	175 responses

Weighted average calculation 633 ÷ 175 responses = 3.6 years minimum recommended

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Organisation:	Region or District:	Division or Section:	Sub-Section:	Parast Ag LS/Vet	13 Trg Res

28. Does your staff usually work in this area that long? No Answer

(146) Yes (25) No 6

29. At which levels are too frequent transfers a problem? (Tick as many as appropriate)

See text (Chapt.VIII-J) (56) Professional (66) Diplomate (75) Certificate (54) None 4

30. What are the main reasons for too frequent transfers?

31. Do your superior officers consult sufficiently with you before they make important administrative or technical decisions?

(89) Usually (67) Sometimes (17) Rarely or never 5

32. Do you have a copy of any of the last 4 issues of Ukulima wa Kisasa in your office or home?

(65) Yes (109) No 4

33. Do you have a copy of any of the last 4 issues of the East African Agricultural and Forestry Journal in your office or home?

(21) Yes (150) No 6

34. Approximately how many communications of technical information from research centres have been received by your office this financial year?

Number_____ See text (Chapter VIII-G)

35. Has enough technical information been received from KILIMO Headquarters Division for extension purposes during this financial year?

(21) Yes (152) No 4

36. In your daily work, what are the main sources of technical information you use?

37. Are research findings available in forms appropriate for technical level personnel to communicate effective with farmers?

(39) Yes (130) No 7

38. When was the last time you discussed technical information with a staff member of a research centre? Yes = 115

Date: Month_____ and year_____ (56) Never 6

39. From what other sources do you receive technical information?

40. What have you found to be the most effective ways of motivating staff to do their best work?

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Organi-sation:	Region or District:	Division or Section:	Sub-Section:	Parast Ag LS/Vet	15 Trg Res

45. What are the major administrative coordination problems, if any, which exist between—

See text (Chapter VIII-G)

a. PMO and KILIMO Headquarters Divisions?

b. PMO and KILIMO regional offices?

c. KILIMO Headquarters Divisions and KILIMO regional offices?

d. KILIMO regional offices and parastatals?

e. KILIMO regional offices and KILIMO district offices?

f. KILIMO district offices and village level staff?

g. Other organisations? (Please specify)

46. Before preparing your annual agricultural sector plan, do you meet with your staff to discuss what should be included?

(116) Usually (34) Sometimes (22) Rarely or never NA 5

47. Please explain your answer to question 46.

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Organisation:	Region or District:	Division or Section:	Sub-Section:	Parast. Ag LS/Vet	Trg Res

48. Please rate the adequacy of your recurrent and capital estimates for the following items: See text (Chapter VIII-H)

Items	Adequate	Borderline	Inadequate
1	2	3	4
a. Vehicle			
b. Transport - fuel, oil, etc.			
c. Vehicle maintenance and repair			
d. Travelling allowance			
e. Equipment and supplies			
f. Training - short courses and seminars			
g. Telephones and t egrams			
h. Upkeep of stations, buildings			
i. Clerical assistance			
j.			
k.			
l.			

49. In which month or months of the year do you experience significant shortages of funds for your work?
Specify months See text (Chapter VIII-H)

50. How many months out of a year are your staff unable to carry out their duties, due to shortages of funds for petrol, vehicles, equipment, allowance, or other items?
Number of months _____ See text (Chapter VIII-H)

51. How often is your organisation's work adversely affected by the following: See text (Chapter VIII-H)

Items	Not at all	Occasionally	Frequently	Very frequently
1	2	3	4	5
a. Delays in issuing warrants of funds				
b. Adequacy of quarterly allocations (cash flow)				
c. Accounting regulations cause delays				
d. Quarterly financial report submissions are late				
e. Difficulty in obtaining supplementary funds				
f. Travel to Headquarters to clear up confusion wastes time				
g. Delays in obtaining safari imprest funds				
h. Delays in obtaining travel warrants				
i. Efficiency of accounting				
j. Delays in receiving supplies				
k.				
l.				
m.				

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Appendix A-IX: QUESTIONNAIRE RESPONSES - AGRICULTURE EDUCATION

QUESTIONNAIRE RESPONSES BY MATI STUDENTS

In April and May of 1979, 967 students in 8 Ministry of Agriculture Training Institutes (MATIs) completed self-administered questionnaires for this study.* This is a 74% sample of all students enrolled at these 8 MATIs. The less than total sample was necessitated by the involvement of some Certificate sutdents in day-long final examinations during the visits of the surveyors.

About 59% of the respondents were Diploma students and 41% were Certificate students. Approximately 90% were male and 10% female. See the chart which follows.

Diploma students, on the average, had over 5 years of field experience as Certificate holders. Some Diploma students, however, were form VI leavers, without field experience. The latter was especially true for certain courses, such as the Crops course at Ukiriguru.

Nearly all Certificate students came directly from Form IV of secondary school and were without field experience.

TABLE 1. A Classification of Respondents to the Student Questionnaire

MATI	NO. OF DIPLOMA STUDENTS	NO. OF CERTIFICATE STUDENTS (1)	NO OF FEMALE STUDENTS	NO. OF TOTAL STUDENTS
Ilonga	17	57	21	74
Mlingano	59	--	1	59
Morogoro	36	--	--	36
Mtwara	--	92	7	92
Nyegezi	130	70	3	200
Tengeru	23	109	15	132
Ukiriguru	79	52	18	131
Uyole	225	18	35	243
TOTALS	569	398	100	967

* The terms "All MATIs" and "All Students" used throughout this section refer to the 8 MATIs surveyed and their students.

NOTE: The questions which follow are identical in wording to those that appeared on the questionnaire form.

Q. 1. After secondary school, was agriculture your:

	Diploma Students	Certificate Students	All Students
First choice?	53%	45%	50%
Second choice?	30	26	28
Third choice?	12	19	15
Other? (please explain)	5	11	8

Q. 2. (a) What are the major problems you are facing as a student? (1)

(all comments made by less than 2 respondents were deleted from Q.2.(a).

	No. of Diploma Students	No. of Certificate Students	Total No. of Respondents
Academic problems			
Some topics (subjects) are irrelevant and some are incomplete	21	14	35
Shortages of time to study, rest, etc.	3	28	31
Poor student-staff relationships	10	16	26
The standardization of tests is bad, unfair, etc.	7	16	23
Too many topics (subjects) in our curriculum	2	21	23
Shortage of good (able) tutors	12	10	22
Inadequate reference books and materials	14	3	17
A shortage of facilities	2	13	15
Inadequate transport	8	7	15
Inadequate housing	12	3	15

(1) The response categories shown for Q. 2 were developed by survey staff members post-survey. The responses to Q. 2 only were from a 20% sub-sample of the 967 total respondents, or from approximately 196 students representing all

	No. of Diploma Students	No. of Certificate Students	Total No. of Respondents
Inadequate supplies and equipment	6	9	15
Too much theory is taught	7	1	8
There is a shortage of practicals	6	2	8
The administration is poor	3	2	5
It is difficult to study after long field work	5	-	5
There are too many tests	3	1	4
A shortage of tutors	3	1	4
Inadequate field trips	2	1	3
There is not enough specialization	2	1	3
The examinations are unfair	2	-	2
Non-Academic problems			
Poor food or unbalanced diet	47	13	60
Insufficient salary or allowance	22	14	36
Insufficient recreational facilities	7	-	7
We are not provided enough soap and other personal items	5	-	5
Inadequate freedom of expression	1	2	3
Inadequate leave time	3	-	3

(b) What do you think should be done to reduce these problems?

NOTE: All comments made by only 1 or 2 respondents were deleted.

Academic problem solutions			
Improve the facilities and equipment for training (mostly practicals)	11	16	27
Assign tutors who are able to teach well (or instruct tutors in methodology	17	9	26
Reduce the topics or increase the length of the course	2	22	21

	No. of Diploma Students	No. of Certificate Students	Total No. of Respondents
Throw out the standardization of tests policy	6	15	21
Improve student-tutor relationships	5	13	18
Delete the irrelevant topics (revise the syllabus)	15	2	17
Provide MATIs with better administrators	10	5	15
Increase the practical's share of time	11	3	14
Improve the transportation situation	6	5	11
Obtain more and/or better reference books or materials	10	1	11
Further specialize the courses	2	9	11
Provide more study time	--	5	5
Provide Diploma study to students earlier in their career	5	--	5
Get rid of the Agro-vet curriculum	--	3	3
Provide more tutors	2	1	3
Reduce the number of tests	2	1	3
Non-Academic Problem Solutions			
Improve the quality and or nutritional balance of the food	36	8	44
Increase the salaries or allowances	11	13	24
Improve dormitories	5	2	7
Solve pay problems by following regulations	1	2	3
Increase student leave time	3	--	3

Comments on Q. 2.

The solutions offered by students were not very creative. In categorizing the narrative comments we have no doubt lost much of what value they did have in pointing out creative solutions to problems, yet for brevity, it was necessary.

Because of categorizing, the reader can compare the magnitude of each problem area as perceived by students.

Readers sho have been involved in the MATI system will not be surprised as they observe these student opinions. They will have heard complaints about food and salaries many times and will have heard Certificate students say the syllabus is too comprehensive. Diploma students indicated comparatively more concern about irrelevant or incomplete syllabus topics, inadequate reference materials and a poor balance between theory and practicals. The students who felt some topics were irrelevant were almost entirely enrolled at MATI Uyole and Nyegezi as were those who wanted better food. In the case of food, it is interesting to note that these were the only 2 Institutes where the questionnaire was filled out in the dining hall prior to lunch.

Mtwara students registered strong concern about the policy of standardizing marks while they and MATI Ilonga students had more than an average concern about insufficient equipment, facilities, or transport.

Q. 3. Tick (✓) one response for each of the following aspects of the Institute's operation

(Total Respondents - 967

ASPECTS OF THE INSTITUTE'S OPERATION	Response Categories	Ilonga	Mlingano	Morogoro	Mtwara	Nyegezi	Tengeru	Ukiriguru	Uyole	Diploma Students All MATIs	Certificate Students All MATIs	All Respondents
	good	8%	7%	14%	20%	6%	29%	28%	14%	11%	22%	16%
Availability to you of library resources	fair	52	61	67	62	36	50	63	59	54	53	53
	poor	40	33	20	19	59	21	9	28	35	25	31
	good	5	14	38	26	13	42	21	14	16	26	20
Access of library at convenient hours	fair	35	74	50	52	50	39	54	54	54	46	51
	poor	59	12	12	22	37	19	25	32	31	28	30
	good	3	9	74	38	5	8	9	44	26	15	21
Availability to you of pencils, paper, etc.	fair	22	47	20	34	28	41	26	41	36	29	33
	poor	75	44	6	27	68	52	65	16	38	56	46
	good	4	0	0	2	5	18	5	33	16	8	13
Availability of necessary equipment and supplies for practicals	fair	28	26	33	21	37	38	39	50	42	31	37
	poor	68	74	67	77	59	44	57	18	42	61	50
	good	40	7	26	6	24	55	15	60	36	33	34
Availability of land, livestock and water	fair	49	59	54	43	54	34	59	36	50	42	47
	poor	11	33	20	52	22	11	25	4	15	26	19
	good	3	32	61	27	21	18	14	24	24	18	22
Adequacy of study time	fair	39	58	36	43	44	32	46	49	48	38	44
	poor	58	10	3	30	35	50	40	27	27	44	34
	good	15	24	28	56	11	38	16	41	25	33	28
The conscientiousness of tutors in meeting their classes and practicals	fair	72	60	64	31	65	46	62	54	60	51	56
	poor	13	16	8	13	25	16	23	5	15	16	15

Q. 4. In general, how well do your tutors know their subject?

	Diploma Students All MATIs	Certificate Students All MATIs	All Respondents
Most know them very well	15%	18%	16%
Some know them very well	58	53	56
Few know them very well	27	29	28

Responses to Q. 4 by individual MATIs.*

MATI	Response	Diploma Students	Certificate Students	All Respondents
A	most			16%
	some			65
	few			19
B	most			10
	some			59
	few			31
C	most	16	12	15
	some	49	62	54
	few	34	27	31
D	most	13	6	11
	some	51	34	45
	few	36	60	44
E	most	0	4	3
	some	47	63	59
	few	53	33	38
F	most			30
	some			50
	few			20
G	most	19	56	22
	some	65	39	63
	few	17	6	16
H	most	12	20	19
	some	62	59	59
	few	27	21	22

* The names of MATIs are reluctantly withheld due to promises made by the study team during the survey that potentially embarrassing data would not be shown. The data for MATIs A, B, and F are shown in the "all respondents" column only to hide the identities of those having only a certificate or a diploma course.

Comments on Q. 4

The larger table shows three major deviations from the average situations. MATI G Certificate students were exceptionally pleased with the knowledge of

their tutors whereas the Certificate students at MATI D and Diploma students at MATI E were less pleased than the average.

Q. 5. In general, how well do your tutors teach (1) theory classes and (2) practical classes?

		Diploma Students All MATIs	Certificate Students All MATIs	All Respondents
Theory Tutors	Most teach very well	20%	26%	22%
	Some teach very well	57	49	54
	Few teach very well	23	24	24
Practicals Tutors	Most teach very well	17	24	20
	Some teach very well	42	44	43
	Few teach very well	41	32	37

Comments on Q. 5

The Diploma students, especially, were somewhat better satisfied with the teaching of theory than with the teaching of practicals.

The response displays for the various MATIs (not shown here) looked very similar with regard to the teaching of theory tutors except for 2 MATIs. At one, a high 48% of the students said "most" theory tutors teach very well while at the other, only 5% said "most teach very well".

Responses to the teaching abilities of practicals tutors varied considerably from MATI to MATI. Averaging Diploma and Certificate responses, the percentages of students ticking "few teach very well" at each of the 8 MATIs were: 57 - 57 - 50 - 44 - 35 - 27 - 26 - and 22%.

Such large differences in students' attitudes toward the teaching abilities of their practicals tutors will warrant some attention by the administrators to find the influencing factors - perhaps supervision, organization of the practicals, type and quality of instruction, equipment and facilities available, tutor morale, student-teacher relationships, and others. It was not a purpose of this study to evaluate individual MATIs, but we will give each principal confidential data for his/her MATI for comparison with the averaged data from all 8 MATIs surveyed.

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Q. 6 Is the relationship between staff and students in this school generally:

Very good?_____ Good?_____ Fair?_____ Poor?_____

Responses	Diploma Students at All MATIs Surveyed		Certificate Students - All MATIs surveyed		All Respondents		TOTAL
	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	
Very good	3%	2%	9%	10%	6%	4%	6%
Good	36	21	25	32	31	24	31
Fair	37	41	30	32	34	38	34
Poor	24	37	36	26	29	33	29

Responses Regarding the Relationship Between Staff and Students

(by individual MATIs, male and female combined)

MATI	Response	Diploma Students	Certificate Students	All Respondents
	very good	0%	8%	7%
A	good	8	15	14
	fair	21	34	31
	poor	71	43	48
	very good	0	0	0
	good	0	28	22
B	fair	40	34	36
	poor	60	38	42
	very good			2
	good			29
C	fair			53
	poor			17
	very good	5	29	7
	good	50	53	50
D	fair	37	18	35
	poor	8	0	8
	very good			24
	good			46
E	fair			28
	poor			2
	very good			0
	good			35
F	fair			50
	poor			15
	very good	2	2	2
	good	22	12	19
G	fair	29	18	25
	poor	46	68	54
	very good	3	0	2
	good	30	19	25
H	fair	41	38	40
	poor	27	42	33

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Comments on Q. 6.

The male and female students did not differ much on the average regarding their view of the relationship between staff and students, although male diploma students ranked it a bit higher than did male certificate students. The diploma students at MATI A and at MATI B and the certificate students at MATI E rated the relationship lower than did those at other MATIs while MATI E and MATI D students rated it higher.

Q. 7. (a) How would you rate the quality of the training in the ag-biased secondary school you attended?

For Certificate Students with ag-biased secondary training only:

	Students responding
very good	17%
good	48
fair	26
poor	10

(Total respondents = 249)

(b) How much of your certificate coursework has been unnecessary repetition of secondary school courses?

	Students responding
most of it	6%
a lot of it	11
some of it	56
little or none of it	27

(Total number of respondents = 249)

Comments on Q. 7

Nearly three-fourths of the Certificate students who join MATIs from ag-biased secondary school felt that "some" to "most" of their coursework has been unnecessary repetition. This should be given consideration at the time the common syllabus is revised.

The 249 students who indicated ag-biased secondary experience by responding to this question represented 62% of the total Certificate respondents in the survey.

Q. 8. How much of your Diploma coursework has been unnecessary repetition of Certificate courses? (for in-service Diploma students only)*

Student Responses by individual MATIs

RESPONSE	Ilonga	Mlingano	Morogoro	Nyegezi	Tengeru	Ukiriguru	Uyole	All MATIs
most of it	18%	9%	0%	7%	5%	2%	9%	7%
a lot of it	24	17	3	29	5	14	7	15
some of it	47	66	63	51	64	70	75	64
little or none of it	12	9	34	13	27	14	10	14

*There were 448 respondents to this question or 79% of the total Diploma student respondents in the survey.

Comments to Q. 8

The responses again indicated a need to look into the issue of unnecessary repetition when revising the Diploma syllabuses (86% of students on the average said there was at least "some" needless repetition). The amount of unnecessary repetition perceived by respondents varied from course to course. The Ranch Management course students at Morogoro, for example, indicated little useless repetition, whereas the nutrition course students at Ilonga felt there was a lot comparatively.

INTERVIEW RESPONSES BY MATI

PRINCIPALS AND COORDINATORS OF STUDY

This section summarizes responses of Principals and Coordinators of Study who were interviewed at 8 MATIs (Ministry of Agriculture Training Institutes) in April and May 1979. The interviewers, using "discussion guides," spent an average of three to four hours with Principals and an average of one hour with Coordinators of Study. The interviews were informal, as opposed to the often-used structured or controlled interview and varied somewhat from MATI to MATI. Time constraints required that many questions be omitted and that probing be minimized during the interviews with Coordinators of Study.

The respondents included seven Principals and one Deputy, five Coordinators of Study and three Acting Coordinators. The Principals were well-experienced and had held their title for 1 to 5 years. The Coordinators had all been assigned within the past one and one-half years, indicating a rapid turn-over rate in this crucial and difficult post.*

The comments attributed to these administrators are only approximations of their oral responses. No doubt some distortions have resulted from selective listening, incomplete notes and editing, and from response grouping where used. In some cases response fragments were moved from one question to another so as to fit the proper question.

Respondents were under pressure to give quick, unprepared remarks. Considering this, the comments were generally commendable and were remarkably candid. The Survey Team thanks the Principals and Coordinators of Study heartily for their time and open support of the study.

A hyphen (-) at the beginning of a sentence indicates a new entry or a new respondent.

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* Deputy Principals are charged with the responsibility for academic programs in the Division's job descriptions, however, in most MATIs the Deputy is also the Coordinator of studies. Thus, the people in charge of academic affairs are commonly referred to throughout the system as Coordinator of Studies.

PART 1 - ACADEMIC AFFAIRS

1. Regarding the Principals' and Coordinators' satisfaction with, or evaluation of, the overall quality of education at their MATI, the following comments were made (arranged by decreasing satisfaction):

	Respondents (Number)
- above average (especially in theory)	1
- one Diploma course is quite good, the other is fair	1
-the Diploma course is good, the Certificate one not so good	1
-the Certificate course is quite good. Dipoma courses - one fair, one poor	1
- Diploma - quite good. Certificate course, below expectation (fair)	1
- the Diploma course is quite satisfactory now. The certificate course needs improvement	1
- I'm satisfied with the Diploma course. The Certificate course is fair	1
- between fair to good	1
- It's fair	1
- It's average or "C"	1
- It's adequate	1
- I'm not quite satisfied	1
- It needs much improvement. It's fair	1

2. What are the Institute's major problems constraining the quality of education?

(Responses of both Principals and Coordinators)

Syllabus and Methods	No. of Respondents
- The Certificate syllabus is over-crowded	5
- The Certificate syllabus lacks definition	2
- Theory tends to be stressed. Even Moderation Boards and exams stress it.	2

	No. of Respondents
- The necessary field trips or tours are not taken due to shortages of funds	2
- The Certificate syllabus is partially irrelevant	1
- Do we have the right philosophy (what are we training Certificate students to do)?	1
- Practicals are poorly taught	1
- More time and longer periods are needed for Practicals - Now we just demonstrate rather than practice	1
- The schedule needs time allocated for productive self-reliance work	1
- The operation of a production farm at a training institute is questionable	1

Staff Constraints	No. of Respondents
- The staff teaches poorly due to a lack of teacher preparation training	5
- Too few staff members makes Practical groups too large	3
- The staff emphasizes book knowledge too much	3
- Teaching is too theoretical; tutors don't teach useful things. They need reorientation	3
- The staff members lack the practical (field) experiences needed	3
- The overall quality of staff is low	2
- Some staff members don't like teaching	2
- Insufficient staff scholarships to upgrade staff	1
- Staff members need more training in their specialized areas	1
- Staff transfers are made without consideration for effect on the MATI or without contact with the MATI	1
-Staff turnover is too high	1
- Staff members are not selected and oriented well	1

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	No. of Respondents
- The specializations of staff members are not suitable for the curriculum	1
- In retraining Bwana Shambas, tutors lack experience in dealing with adults	1
- Uyole Ag Center is a Parastatal but salaries don't reflect this status; thus, the tutors get demoralized. They wanc to transfer to research where they will work less for more money	1

Student Constraints	No. of Respondents
- The quality of students is poor	3
- The backgrounds of Diploma students are too varied (some are form VI leavers with no Ag Training; some were in the field 10 years, etc.) to teach a common curriculum	2
- Many Diploma students have been out of school too long and are thus weak in math, science and English	1

Organization and Management Constraints	
-There is too much policy dictation from headquarters	2
- Centralized education is not good	1
- Too little or too slow assistance from headquarters (Example: they demand lesson plans, but don't show us how)	1
- Headquarters must demand discipline from the MATIs	1
- Programs are initiated but funds don't accompany them	1

Facility, Equipment and Supply Constraints	No. of Respondents
- Shortage of facilities	7
- Shortage of equipment for teaching	5
- Shortage of transport vehicles and parts	4
- Shortage of library books and materials	4

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	No. of Respondents
- Shortage of land	1
- Fuel shortage for cooking	1
- Lack of crops necessary for instruction (MATI Mtwara lacks tobacco, coffee, tea, wheat, and cotton plus irrigation water)	1

3. In general, what changes are needed in teaching methods? (asked of the 8 Principals only).

	No. of Respondents
- We should conduct methods short courses (teacher training) for all staff	4
- Tutors should train an extra year for a teaching certificate	2
- We need a standard format for teaching	1
- We need to teach lesson planning	1
- Staff members need to get out of their offices more for information and experience	1
- We need to orient tutors to have a right attitude	1
- Tutors should be sent for field experience before teaching	1
- Headquarters should provide a roving specialist to train and assist tutors, coordinator of study, etc.	1
- We need more teaching aids, study tours and practicals	1
- We need more facilities	1
- Tutors must motivate students to learn	1
- Tutors should be less bookish and use methods other than lecturing or note giving	1
- There is too much talking - tutors need to demonstrate more and use more training aids	1
- We should hold a workshop for each topic area for the purpose of developing teaching notes	1
- Centralized education forces us to teach irrelevant subject matter and to leave out necessary matter	1

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No. of Respondents

- We need longer practicals so a tutor can demonstrate and the students can practice 1
- The schedule needs to make time for productive self-reliance projects 1
- Our activities need discipline. Headquarters should demand this and they should define work hours 1

4. At what level do tutors teach, how, and how well? (asked of Coordinators of Study only).
   - Tutors tend to teach too much, especially new ones. They tend to follow their University notes. They are confused over the proper level to teach the Agro-Vet Certificate course.
   - The Agro-Vet syllabus is very confusing. I like the Ag-biased secondary school syllabus format. We need (1) a topic handbook for students and (2) a tutors' manual, to be developed. We need specialization at Certificate level. The syllabus is now too long for student mastery. It needs shortening.
   - The tutors teach well both in theory and practicals and the level is O.K. The proper level for teaching the retraining course is made difficult by the students' variation from Form IV to Standard 8 leavers.
   - There is not much confusion over the best level to teach in the Diploma courses. Tutors use student-teacher discussion. The scheduled practicals are often followed by after-school-hours practice by students, if the tutor only had time to demonstrate during the scheduled period.
   - Students complain about many tutors. Tutors need a 6-month course in methodology - The British Council's 3-week course is not enough. Tutors need to use visual aids, and they need to take

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part in study tours and seminars. A handbook of notes needs to be compiled.

- Tutors are doing O.K. If we had student manuals to hand out, then note giving would be unnecessary and we could discuss more.
- Tutors tend to go too deep. They use training aids and equipment a lot. The library is well used. Students are not interested in part of the Agro-Vet syllabus.

5. What problems and successes are you experiencing with Practicals? What % are assessed and who conducts the assessments? How many Practical classes are released or let out early? Do senior staff (lecture tutors) take an active role, and to what degree have specimens been collected?

These questions were asked one at a time of Coordinators, but in great haste and with inconsistency, which led to incomplete responses.

- Tutors should have field experience. Pasture and livestock tutors have collected specimens, but others haven't done much. We are not doing badly in assessing. Some practicals are missed or let out early.
- Tutors are missing some practicals (less than 15%). Our quality is fair. Early release from practicals is a great problem. Younger tutors hold classes longer. Students do not press tutors much to release them early.
- A practical period is often too short and practice has to be done after hours. Tutors have done quite well in collecting specimens. They do well in assessing. The theory tutor is responsible for practicals. About 10% of practicals are dismissed.
- Practical groups of 20 are too large. Tutors are keen to collect specimens. (NOTE: The surveyors didn't see much collected materials or specimens at the MATIs, although we made some efforts to do so). All practicals conducted are assessed. A few are dismissed. The students are held a full 3 hours.

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- The work load for our tutors is too heavy. We are short on some equipment. Tutors do collect specimens. Few practicals are dismissed.
- Ten to fifteen percent of practical classes are dismissed.
- The same tutors teach theory and practicals. The work overload causes us to schedule large groups of students per practical section. Also we are short on some practical equipment, especially survey instruments, microscopes and tractors. The specimen collections are not good, except for the crops museum. About 20% of practical classes are dismissed completely and some others dismiss early.

6. How well are the Practical classes being conducted and evaluated? What kind and level of tutor is able to adequately conduct them? To what degree are tutors developing the knowledge and skills needed by graduates in the field? (These were 3 separate questions asked of Principals.)

- We are doing excellently in Practicals, using groups of as few as 7 students. They are assessed every time - no problem. The tutor training necessary depends on the topic. Ag mechanics Practicals require more knowledge than does the corresponding theory. Weeding, however, can be taught by a Certificate holder.

  The tutors are trying to be practical. I'd say they are 75% relevant and if they had field experience, it could rise to 90%. We are trying to get tutors in more contact with farmers.
- Tutors are often limited themselves in Practical skills. The number of good Practicals are limited. Sometimes poor substitutes replace the Practicals intended by the syllabus. Practice and assessment time is short. The syllabus doen't schedule assessment nor allow time for it plus practice.
- In some cases a Certificate holder can teach Diploma Practicals - For example, carpentry or survey. Tutors with less education (for example, Certificat holders) may lack confidence. About 30% of theory tutors take no part in their topic Practicals.

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Tutors, especially graduates (B. Sc. holders), must be forced to do Practical work themselves so as to be able to conduct Practicals.

Some students may be learning more than will be required in the villages. Our Practicals may not be realistic (from a village standpoint). Theory teaching may be more unrealistic. We teach some unnecessary things, for example, too much statistics in the Diploma course.

- A model ranch would improve our Diploma course. We also need a workshop. Practical teaching is weaker than theory teaching. Assessment is O.K. on the average.

Our theory tutors conduct the Practicals as well. Certificate holders run the retraining Practicals. There is an experience deficiency at first.

The skills learned here (Diploma course) are relevant, except for those graduates going to the Regions. In retraining, the time is too short.

- We have problems in evaluating Practicals. Often end-of-term Practical tests are given.

The MATI is now surveying the staff to see which ones can best teach each skill. We also get some outside help from well experienced people. We use self-reliance projects as an opportunity to develop skills in depth--for example, tractor driving.

- Practicals are fairly well-conducted in our Diploma course. Each student has a Practical plot (crop) which he must maintain over a 2-year period. It is routinely evaluated. Other skills are mostly evaluated via tests.

The Certificate students are difficult to handle efficiently. Classes are too large and the repetition of group after group bores the tutors.

[illegible] should have a Diploma degree to teach the

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Certificate level students, unless a Certificate holding tutor is older and well-experienced. Some Diploma holders are also O.K. for teaching diploma students. Certificate-trained tutors may cover too many useless skills.

- Practical skills are taught poorly. Tutors teach them superficially, doing what is easy for them. Practicals should be done in the field with villagers. Tutors and students should do Practical work together. Too much time is spent marking papers, compiling marks, standardizing marks, etc. It leaves no time to stress quality in Practicals. Don't use Certificate level staff to teach any Practicals. They should be assigned to MATI projects only (Example, the dairy). We teach too much which is not useful for Certificate graduates. Farmers need simple knowledge and skills; they need help in decision making. Diploma courses are quite good (at imparting useful skills and knowledge) with the possible exception of 2 courses in our system. Tutors need short courses in skills areas.
- We have a full staff so Practical groups can be very small. Our students help plan irrigation projects in villages. Our land use students develop land use plans for villages. Our agro-mech students could practice ox-plowing in villages.
- We need long Practicals and we need student practice in Practicals, as well as tutor demonstrations.

At minimum, a Diploma holder is needed to teach Practicals (to Certificate students) for extra knowledge and confidence.

It's impossible to say whether we are preparing our students to fulfill their Bwana Shamba role because we don't know what that role is.

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7. <u>What contact do MATIs now have with farmers and do they participate in village projects or training? How and how successfully? How can they be improved?</u> (Principals only)

- MATI Uyole.

Students here have farmer contact through their Extension demonstration plots as well as do some tutors. A Uyole Agriculture Center committee exists to develop ways for training and research staffs to assist nearby farmers. (The Principal was himself a member of an Ujamaa village.)

We need to evaluate what we have been doing and redesign a program. There is a shortage of academic time and a transport shortage. Staff as well as students need to be assigned to villages.

- MATI Ilonga

We have just started reaching out to villages through our Extension projects. There was some earlier outreach work in the area of human nutrition.

One must start Extension contacts early in a cropping season to be useful to farmers.

-MATI Morogoro

Our contact with farmers is very minimal. We have no outreach program. (Farm Management Diploma and Retraining Course)

- MATI Mlingano

We have a village block committee which plans with villagers. One village is being assisted but 3 are planned for. This season we plowed, harrowed and seeded 5 Ha. in a village. Students helped after class hours.

The MATI needs a budget for village assistance.

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-MATI Tengeru

Most tutors have little farmer contact but a few have a lot. In Extension, one student is assigned to 1 or 2 farms. At the end of the class or season, an evaluation of the student's work is held wherein farmers, tutors, and students get together to hear the students read their reports on farmer assistance. The farmers can support or contradict the student's analyses.

-MATI Ukiriguru

Students are assigned to specific farmers (and to village committees) to practice Extension methods. It has not been very satisfactory. Six villages lie within 4 miles, but bicycles are always breaking down and parts are a problem.

Some farmers come to the MATI to seek advice on cattle diseases and management. The MATI cooperates with research staff to conduct an annual Farmers' Day Program.

-MATI Nyegezi

Students and staff have assisted villages to plan irrigation schemes and have drawn up land use plans for villages.

The Extension staff has sent questionnaires to some villages. They have collected the names of village leaders, etc.

- MATI Mtwara

Farmer contact has been minimal so far.

8. How will a Farmers' Training wing at the MATI help or detract from the quality of education? (asked of Principals at the 4 MATI's scheduled for this program, plus 2 Extension tutors)

-Farmers who come for short courses can exchange learning or ideas with tutors and students. It can build good relations between

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farmers, staff, students, training, research and extension. Farmers will identify with the Institute, improving our public relations. It will help farmers also (to farm better).

- It will broaden the tutors' experience in training. Students (Diploma) can learn through training farmers at the Center. Bwana Shambas can themselves train here, then bring their farmers here for training. All concerned (the tutors, Bwana Shambas and farmers) should plan while here how to use their new learning, upon the farmers' return to their villages.

Students, farmers, and tutors through interaction will learn from each other.

- It will help our Extension training. It will strengthen teachers. Village demonstrations involving all deparments would be good. The present 4-week field assignment for Certificate students could be used directly or its time redistributed throughout the year to increase Extension time.
- What we are doing now is involving irrigation and land-use course students in designing village irrigation plans and land use plans.

We must get experienced field staff to join the MATI Extension Department to make farmer training work.

- We should train farmers for 1-2 weeks on specific narrow topics--Example - human nutrition for the village.

We should reorient the academic program toward development of villages. We will need to develop a physical map and conduct a community survey (an Extension Staff member).

- I am optimistic about farmers' training. Farmers, tutors and students will learn from each other. Students and tutors could manage a block in the village collective farm. It will bridge

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MATI and village.

Our learning institutions are islands--village involvement will help. The farmers can use MATI facilities (for short courses) during student breaks.

9. How do you see the role (duties) of a field worker (Bwana Shamba) at village level? Does this fit with our training? (Principals and Coordinators).

- To advise the village manager in agriculture overall. Also he is a liaison between the District Officers and the Village Manager or Village Council. Out training is satisfactory. The Bwana Shamba can look outside for further technical advice.
- They are teachers of farmers. They help development committees to function and help village leadership. Our curriculum needs emphasis on meetings and on socialization aspects.
- To educate the farmers and to learn from them. Retraining students get only 12 hours of Extension and no Extension planning.
- To advise farmers and help the Village Council to plan. To teach by visits. To concentrate and demonstrate.

The older Bwana Shambas don't know much. New Bwana Shambas should be assigned to accompany those experienced in some specific program area such as coffee.

- To help with Ag development programs, on the technical side. Play a leadership role. Participate in village committees. Our training may not be enough for the last two roles.
- To assist in village management with emphasis on Ag production. To advise the village chairman. To assist in planning and implementation of projects undertaken by village management. Serve as a channel to higher authorities or higher experts.

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We probably don't train for these roles. The Bwana Shamba doesn't actually do these things. They lack confidence. They shy away. They want to avoid blame. Thus, they choose low key projects of personal interest to them. The University sends students for field experience in research centers and MATIs. They should go to villages. We should teach problem solving through doing it.

- The role has never been defined for us.

10. <u>What is your opinion of the multi-purpose (Agro-Vet) Certificate syllabus (for Bwana Shambas) and what are your recommendations</u>? (Principals and Coordinators).

- The syllabus is very confusing. Students are disinterested in parts of it. Too much content to cope with. Some tutors go too deep.
- I like the idea of a general syllabus. One can specialize later. Revise the syllabus with feedback from the field.
- It needs pruning. It's too broad to cover in two years and the level to teach is unknown.
- We can cut down on some areas. The name Agro-Vet should be changed. The syllabus is welcome because one Certificate holder can do all the village work. It has too much theory in it. It needs to emphasize animal production rather than Veterinary Medicine. It needs to have the hours allocated in divisible units to simplify scheduling.
- The syllabus is O.K. but common exams aren't warranted until facilities are standard in all MATIs.
- It needs drastic changes. Shorten it somehow. Students may get too much useless information.
- It's too much. I suggest we have one year general and one year specialized. We should chop off unimportant content such as

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kenaf culture. Parastatals and KILIMO officers should have been involved in setting policy for the Agro-vet course and assisted in curriculum development. Their anger is resentment.

- It needs defining
- Define the content and set up a job description for graduates. Name the course "General Agriculture."
- It needs specification and the placement of standard equipment at each MATI

11. How helpful would it be to have good quality tutor guides made available to tutors? (Such would specify depth) (Coordinators)
    - Useful but it must be participated in by tutors
    - Very useful
    - Very good
    - We need a tutor manual and a topic handbook.
    - Very useful - it would equalize MATI instruction for national examinations and we would know what specimens to collect and what materials to obtain.
12. What is your opinion of having those MATIs which provide Certificate training each represent an ecological and/or agricultural zone so that the multi-purpose curriculum can concentrate on the zonal crops and conditions to some degree?
    - It might be O.K. The problem is that secondary school students now come from all parts of the country. Some zones would be unbalanced in terms of secondary students to draw from and in terms of Certificate graduates needed. Also, a Bwana Shamba should not return to his own village. Secondary schools or the Regional Development officers might take over the training of Certificate students on a regional level.

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- It's O.K. There are too many MATIs. Four is enough. I like the idea a lot. It would pool our resources including staff.
- Zonalized MATIs? Maybe. It would reduce the high cost of student travel.
- If it were to be done, I'd suggest the students be recruited from everywhere but be trained for crops of the zone and be placed within the zone after graduation.
- Some zones may not have enough student candidates to draw from. (During some two-way interaction the respondent identified the following potential advantages: Zonalization might reduce expenses, reduce homesickness, and boost morale. But, it could allow the Bwana Shambas to look after home affairs on government time.)
- I like the idea.

13. (a) Are there any changes you recommend in national policies regarding the academic program, and (b) What are your views regarding present final examination procedures? What suggestions for improvement do you have? (Combined responses to (a) and (b) follow from Principals and Coordinators).

- Headquarters should involve all people and all Institutes when making policies, as well as Regional KILIMO staff.

  Our final exams are typical of the British system. The procedures are O.K. Moderation Boards and Examination Boards reduce complaints and someone from Pamba House (Headquarters) is needed to insure fairness.
- Standardization of marks is not good. Also, the common final examination for Certificate students at all MATIs should be thrown out. Continuous testing is O.K.
- Our Diploma course needs a 3rd year added to develop excellence in practical skills.

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Training facilities, equipment, etc. need to be standardized at the Certificate training MATIs to make national exams meaningful.

The present examination system causes tutors to stick to the syllabus and it gets Pamba House staff in contact with MATIs, but it is very costly and it implies ineptness of local staff.

A neutral person should chair moderations boards, not always Pamba House staff.

The moderation board for common exams might best construct the questions themselves.

- More discussion is needed between MATI and Headquarters staff. And standardization of marks should be discontinued.

  Pamba House should work out long-term plans for MATIs and make them known. Principals don't know what will happen until the last minute.

  Regarding final examination procedures - I have no complaints although they are too expensive. We might send all exams to Pamba House for moderation.

- There is no big problem with policies. Maybe there is a bit too much authority used, rather than discussion.

  I don't favor common exams. They are too elaborate for the value. The Practical portion especially should be dropped.

- Regarding policies, we now need to stabilize our programs (not change them). The examination policies are not bad, but expensive. Common exams are questionable, or, they need to be handled more simply. Also the need for a moderation board is questionable. Outsiders are helpful on such boards, if used.

- The common exam is a premature idea. MATIs are too non-uniform now; students may vary, tutors do vary, and some MATIs cannot grow

crops while others can, etc. We should substitute something for the standardization of marks, maybe use a committee to evaluate marks.

- A moderation board is necessary to insure that questions are within the scope of the syllabus and to put pressure on tutors to cover all of their topic in class. Also the board evaluates the question's depth and practicality. I find that outsiders on the board insist on questions that are outside of the syllabus and they are rather lost throughout the exercise.

  The common exam took 32 days in marking last year and is too costly; about Sh. 4,000/= per tutor last year, including transport. Plus, this year all the Coordinators of Study and Principals will attend. The solution is to mark the papers at the MATI.

- The Exam Board is O.K. Moderation Boards are new for us.
- Last year our Moderation Board consisted of 3 department heads and 3 outsiders present at a time. The outsiders changed as topic areas changed. This worked well. We don't need to write 3 times the number of questions to be used in a paper.
- A policy that is wrong is Headquarters re-instating failed students. We have an exam board to decide who fails. Re-instatement embarrasses tutors and administrators and disillusions them. A Moderation Board is needed now though tutor training may make it less needed.
- Final exams have much emphasis and were increased in weight at last year's training conference. The common exam questions this year were too bookish or too theoretical.

NOTE: Following the responses, some of the respondents were asked if they could approve of 3-member Moderation and Exam Boards (all staff would sit

on the final Exam Board session), to include: (1) a representative from Division Headquarters, (2) the local Coordinator of Studies, and (3) the local Department Head whose topic is being investigated at a given time. Of the five or more MATI administrators asked this unlisted question, all either said it is a good idea or it is O.K.

14. A checklist of some procedures or functions expected of MATIs (Coordinators). The reader should know that this information was hastily and incompletely collected.

a. Staff records - data too incomplete for comment

b. Test schedule for continuous theory assessment. All MATIs visited developed and used a schedule. The numbers of tests scheduled varied from 4 or more per paper to less than 3. (We only saw a few schedules.)

c. New staff orientation - a tour of facilities and introductions around the MATI were said to be commonly given to new staff members, along with preliminary information on the academic program. MATI Mlingano gives out a staff orientation kit.

d. Career development plan for staff. Mlingano used one.

e. Teaching load chart. Rather standard at all MATIs visited.

f. Teaching diaries (daily record of teaching). Most of the MATIs visited used a diary, usually kept by students. MATI Nyegezi's diary showed the time of arrival of the tutor. MATI Ukiriguru used a single sheet collected once per day from the recording student.

g. Schemes of work - data too incomplete for comment.

h. Lesson plans and class notes - very few tutors had thus far arranged their course materials into lesson plans or unit plans. Approximately 20 sets of class "lecture" notes were hastily reviewed. The surveyors saw little if any examples, problems, exercises, reading assignments or training aids suggested, although they may

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have been missed or forgotten in the hurried perusals. In every case, the notes appeared in "complete sentence" or book form -- apparently intended for chalkboard display or dicatation in exactly this form. The notes were bookish but were generally simply written and indicated a good deal of effort by the tutors.

i. Assessment schemes for Practicals - the schemes had been developed for the common Certificate syllabus by request of Headquarters. These need trial and refinement.

The MATIs varied widely from almost no schemes to all schemes being completed for Diploma courses, according to Coordinators.

j. No data

k. Liaisons (by tutors) with researchers, Ag field staff, farmers, etc. to keep up professionally.

Seven of the eight MATIs visited had some kind of farmer outreach program through their Extension department (see Q. 8). These seemed generally weak and involved few staff in the main. The amount of contact between MATI staff and the Ag field staffs, research staffs at the same Institute, and the University staff when next door, was given as: poor, 2 MATIs; good, 3 MATIs; much, 3 MATIs (as reported by administrators).

l. Early morning Practicals - meat inspection and livestock Practicals tended to be done before breakfast. MATIs varied widely in the amount done, what courses of students did them, and for how many months of the year. The surveyors got an impression of casualness in this activity.

m. Village block Practicals. Refer to Q. 8 and Q. 7.

n. Training aids available - All MATIs visited had at least a basic set of audio visual equipment, received through the recent World Bank Loan. The slides, filmstrip and overhead projectors were

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seldom used. Most MATIs have few, if any, film strips, slides or wax pencils. The Survey Team feels that tutors won't use these aids to teaching much until they have had instruction on their use.

Some efforts were being made to collect specimens but only range tutors seemed to be doing it thoroughly consistently. Some of the crops and soils labs seen were almost barren and some were well started. Collections of insects and soils seen were generally very inadequate.

During hurried tours, the Survey Team noted that the new laboratories at MATI Nyegezi are being well equipped and those at Ukiriguru looked well-used. Tutors at MATI Mlingano had made some equipment and some training aids. At 2 MATIs, we were told that students had erected entire buildings.

Crops museums were underway at all MATIs visited.

o. Supervision of teaching activities - Some MATIs were said to have supervision done by Department heads as well as by the Coordinator of Studies. None of the Coordinators volunteered that they entered theory classrooms to observe and critique though they sometimes inquired from students.

In addition to using teaching diaries, a few tutors in some MATIs were asking students to evaluate their teaching via a rating form.

p. Tutor training via seminars held at the MATI - One MATI administrator reported that a series of 48 hours of seminars had apparently been useful. Another reported trying a series and having it fail.

q. Activities of the academic committee - these committees seemed to be active or relatively so at all MATIs visited.

r. Student orientation - MATI Uyole has a full week of orientation, MATI Morogoro has 1 hour and MATI Mlingano hands students individual orientation kits. No information on the others.

s. Student instruction on how to study - Five MATIs reported doing some, but not much, it seemed.

t. Student streams - Theory classes at various MATIs were often divided into streams of approximately 30 students; however, others had streams of 37, 44, 49, 66 and 121 students where it was felt a classroom or tutor shortage warranted it. The largest Practical group noted was about 35 students, but half this size seemed to be most common and groups as small as 7 were noted.

15. Do research staff teach, how much, and how well? (Coordinators) Responses varied from "no" to "a few" and "yes". Only at MATI Tengeru did researchers (the Dutch team) seem to teach regularly. At others, they mostly guest lectured. Non-attendance was mentioned as a problem with researchers but some past experiences were also said to have been very good.

16. How do staff members keep aware of research or KILIMO recommendations? Personal contacts, yearly and monthsly MARI reports, field trips and production manuals were mentioned as being used. Principals were unsatisfied with the information they were receiving.

PART II ORGANIZATION AND MANAGEMENT

A. POLICIES AND SUPPORT

1. What are the strengths and weaknesses of this Institution? (Principals with some observations by the interviewers)

Ilonga - Has perhaps the best nutrition laboratory in the country, including a small food processing plant. Many crops grow here.

Weaknesses include the lack of equipment to teach the Agro-Vet course, physical isolation, and lack of transport to conduct village work.

Mlingano - Lies near several large ranches. The principal feels it has good student discipline and morale. It lacks adequate staff houses and student recreation.

Morogoro - It is in a good crops area. It lies adjacent to the University and near several large ranches. The MATI lacks office space, adequate land and farm implements. It lies in an area of little livestock.

Mtwara - This MATI has more problems than any other visited. It is in an isolated area, inaccessible except by air much of the year. The water supply in the MATI and in the town is very inadequate (some construction underway) and, importantly to the teaching of the Agro-Vet course, very few crops are grown there. The MATI's equipment is very limited. Staff do not like to go there. The physical facilities are relatively new and adequate.

Nyegezi - The area grows a fair diversity of crops. The MATI has flow and sprinkler irrigation systems from Lake Victoria, and has a large number of high quality new buildings plus equipment through assistance from the Federal German Republic.

Tengeru - Has lots of land and a great number of buildings of assorted types. However, it has inadequate furniture. It lies in a good agricultural area with progressive farmers. It has a Dutch assistance program in horticulture.

There are pressures to bring many new programs to Tengeru due to its facilities. Too many new programs could

fragment the MATI and create a difficult administrative situation.

Ukiriguru - Lies in a good agricultural area. Its facilities are numberous in total althouth it is short of classrooms. It has a rather strong research center next door.

Uyole - Lies in an excellent agricultural area where most crops and livestock flourish. Both crops and livestock research are conducted at UAC. It has many good facilities and good equipment. The weather is pleasant.

UAC operates as a parastatal; however, this status is not reflected in the salaries of tutors whose morale suffers in consequence.

2. Are there printed guidelines for behavior of staff and students? Are there policies for disciplinary action, guidelines for committee responsibilities, etc? (Principals)

No MATI visited was noted to have its own printed guidelines for staff behavior other than in piecemeal minutes from staff meetings, although such may have been overlooked. Government policy was said to be followed. At least three and probably more MATIs had written guidelines for students. Apparently all had disciplinary committees and student governments.

3. Are policies and guidelines circulated and posted? Are they updated with the involvement of staff and students?

Due to a time shortage, only three principals were asked this question. Comments from other questions filled in some of the gaps, however.

Student behavior guidelines tended to be distributed and discussed at student orientation. At least two MATIs distributed student handbooks. Staff memos tended to be either circulated for sign off, or distributed to each member.

Most policies, or changes therin, were recommended by the management committee, the academic committee, the disciplinary committee or student government; or they arose at a general staff meeting. Usually they were passed to a meeting of general staff for approval and then sent to the principal for final approval (and sometimes to DMD).

Students desiring changes went through the appropriate committee of their student government or union, through the course tutor, warden or matron, and if necessary, on to the management or academic committee. At MATI Mtwara, the student government chairman had direct access to the principal in special situations.

4. How often are general staff meetings held?

Bi monthly to monthly - 1 MATI

Monthly - 4 MATIs

Once per quarter (minimum) - 1 MATI

5. What committees do you have and how well are they functioning? (Principals)

Disciplinary, academic and management committees seemed to be common at all MATIs visited. Also typically found were housing, library, and entertainment or sports committees. Less commonly mentioned, but perhaps just forgotten were: kitchen affairs, student welfare, village block, planning, ceremonial, club, and shop committees.

At Uyole, Ilonga and Mtwara, the management committee encompassed both research and training activities. Principals generally indicated satisfaction with the functioning of their committees.

6. What is the ideal size for MATI in number of students?

Only four responses were obtained as follows:

(1) 220 (6 streams of about 36); (2) 300; (3) 500; and

(4) 500 maximum.

7. What conflicts are there between the needs of Certificate programs and people and the needs of Diploma programs and people?

Three principals indicated there was some conflict created by Diploma students wanting some extra privileges while Certificate studnets suspected such privileges were given even when they weren't. Certificate students receive far less monthly financial allowance which no doubt adds to their insecurity in the company of Diploma students. Three principals said there is "no" or "not much" problem. The academic or program needs did not seem to conflict.

8. What kinds of additional support, if any are needed from the Division of Manpower Development? (Principals and some Coordinators).

- Provide sufficient numbers and better trained staff. Provide additional funds and better criteria for their allocation.
- Provide teaching materials and equipment including audio-visual aids. Disseminate information to us.
- Meet standard requirements in quantitiy and quality for each MATI. We need several facilities (buildings) and equipment. The Agro-Vet syllabus needs chopping. Our nutrition syllabus needs revising. Standarized schemes of work for topics should be developed. We need measuring sticks.
- New staff in the curriculum section should spend 1 - 2 years as a Coordinator of Studies so as to better help us.
- We need transport facilities and a workshop. Headquarters staff should visit us, advise us, and work out problems. They should work out long term plans for MATIs and make them known. Principals often don't know what will happen until the last minute.

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- Do better long-range planning with us. Set rules of thumb for facilities and equipment on a per student basis.
- Provide more funds, more library support and more transport vehicles. Pamba House staff needs to exchange ideas with us, not just inspect us. Principals need more authority -- for example, expelled students should not be reinstated.
- Provide a budget for village assistance.
- They need to develop an inspectorate team that moves from MATI to MATI, to see how teaching, etc. is done, to give advice and to apply pressure to bring about improvements. They could look at notes and insist on student evaluations of tutors. Pamba House needs to show more trust of us in regard to student discipline.
- They should come around, advise us, solve problems, distribute materials, etc.

B. CAPITAL DEVELOPMENT AND SELF-RELIANCE PROJECTS. (Principals)

NOTE: These lists of projects are not likely to be exhaustive or exact as they were given with little reference to documents.

Ilonga

Dairy - 80 cows for production and training. It incurs a 30% loss.

Piggery - 7 sows for training. We about break even financially, if one doesn't consider labor, building depreciation, interest on investment, etc.

Poultry - Not operating now. When in operation the unit can handle 800 layers. It made up to a 50% profit (over operational costs only).

Sheep and goats - A large herd with a financial loss of about 30%.

Dairy paddocks and buildings are being or will be constructed.

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Broiler production of 1000 birds is projected for the future

Dormitory construction via self-reliance is underway.

Mlingano

Maize - 40 Ha. - self-reliance

Sorghum - 18 Ha. - self-reliance

Staff houses - 2 grade B and 1 grade C

Construction of Farmers' Training wing, classroom, dormitory and one staff house

Workshop expansion

Farm machinery purchase

Workshop tools purchase

Morogoro

Poultry - 300 layers and eventual expansion into broilers

Piggery - improvement

Dairy - improvement

Maize - 12 Ha.

Pasture development - 10 acres (4 Ha.)

2 staff quarters are being built using development funds.

The justifications given for the projects were that they were absolutely necessary for training and they generally return 10 - 15% profit when operating at full capacity (excluding hidden costs).

Mtwara

Maize - 10 Ha.

Sorghum - 15 Ha.

Cassava - 7.5 Ha.

Ground nuts - 5 Ha.

Farm machinery purchase

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Tengeru

Self-Reliance projects include: 10 acres of maize, some beans, 1/2 acre of coffee, and the poultry and piggery units.

Development projects include: a large horticulture project (including several buildings), equipping the horticulture laboratories, dairy pasture development, building up the sheep and goat herd, and developing an irrigation system master plan.

Uyole

In 1976 the MATI had 100 Ha. of wheat which earned Shs. 445,000/=. Using unpaid student and staff labor, the cost was only Sh. 220,000/=.

The MATI staff are planning to improve the poultry unit. They intend to build a hatchery to sell one-day old chicks at the rate of 2000 per week. They intend to buy 6000 broilers using Sh. 740,000 from the Nordic countries plus a loan.

Plans call for building a gobar gas plant for the poultry project.

As self-reliance projects, the MATI has 25 Ha. of maize and 5 Ha. of wheat.

The purposes of or benefits from such projects, the principal says are: (1) They expect to produce a profit in the long run (2) They provide high quality food for students (3) The activity complements training. The large scale allows involvement by every student. (4) It shows the economics of such enterprises.

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C. FINANCES

1. What are your major financial problems? What solutions are available? (Principals - a summary)

Inadequate funds, especially recurrent funds constituted by far the major financial problem. This year, given the war expenses, some principals reported receiving no 4th Quarter funds. The quality of student food reflected the meager funds available; field trips and staff leaves were cancelled, local travel was reduced to a bare minimum, vehicle maintenance was nearly stopped, etc. Although exaggerated this year, these conditions persist each year. One principal said, "We present minimum budgets and they are always cut."

A less important problem was said to be that funds don't come to the MATI on time, and a staff member is sometimes dispatched to go to Dar to get the quarterly funds. Or, the warrant of funds may be mailed without specifying air mail. At Mtwara, such funds come very slowly by boat.

Finally, newly assigned tutors seem to be unable to get their first pay check sent without a costly personal trip to Dar es Salaam.

Some suggestions for solving the inadequate fund situation included: (1) Obtain more donors to assist MATIs. (2) Cut back on the number of casual laborers where there is now far too much inefficiency and expect more from those remaining. (3) Train the accounts staff. (4) Arrange for project-generated funds (Example - poultry unit) to stay at the MATI for recycling. (5) Allocate recurrent funds to MATIs on a per student basis.

2. Do department heads participate fully in budgeting departmental funds? (Principals)

Department heads submit a budget request with justifications. Depending on the funds which are later allocated to the MATIs, these requests are pared (cut) back by the principals or budget committees, apparently without any involvement by department heads. At Uyole, the budget committee for the entire Ag Center does the paring.

D. PHYSICAL FACILITIES AND TRANSPORT

NOTE: A detailed study of MATI buildings, present and needed, has been done by Nd. J. S. Mende of the Division of Manpower Development Staff. Thus a listing of facilities will not be made here. Also refer to Part C of this section under Capital Development ... Projects, and see Exhibit .

1. What are the limiting factors in this MATI's taking more students?

Ilonga - The present 3 classrooms, 5 dormitories and 1 laboratory are not enough. One dormitory building has been approved. After completion we can house 120 students.

Mlingano - We need classrooms, as two of the 5 we have are used as an office and a recreation room. Presently approved projects include building 3 houses and the Farmers' Training wing facility.

Morogoro - We would need a library, classrooms, dormitories and laboratories to expand our enrollment. Approved projects include: building a workshop, and poultry, dairy and pasture improvements.

Mtwara - If we had one more classroom, we could increase enrollment to 180 -200. Also we would need improvement in cooking facilities, more teaching equipment and more tutors. A farmer classroom building is now approved.

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Nyegezi - We only have dormitories for 250 students and some of those should be vacated because of poor condition. Four new dormitories are approved.

Tengeru - We would need more laboratories, a library and dormitories. Now approved are the horticultural unit laboratories and workshop.

Ukiriguru - We would need 2 more classrooms to handle 300 students. We can house 500.

Uyole - We would need more classrooms to keep our streams to 33 students each. We could then handle up to 500 students. Female and male dormitory separation is not possible now. We have approval to build 2 new classrooms.

2. Can classes and laboratories be rescheduled to carry more students? (Principals)

Most principals were not very favorable to the idea of having half the students studying theory and half involved in Practicals each a.m. and each p.m. in order to better utilize classrooms and labs. They felt it required more staff, and that because Practicals require 3 periods while theory blocks are often 5 periods, they don't interchange well.

3. What MARI (Research Institute) facilities are being used by MATI? (Principals)

Ilonga - We share land, library, storerooms and some offices

Mlingano - We share a dairy unit

Morogoro - No MARI here but we use the University's library, farm, and crops museum.

Mtwara - Not asked

Nyegezi - No MARI attached

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Tengeru - No MARI attached

Ukiriguru - Not asked

Uyole - We use their soils laboratory, their livestock unit and also their crop research plots

4. How adequate is your library in size, content, and staff?

(Principals and Surveyors' obserervations)

Ilonga - The library is too small and it has neither librarian nor assistant. The supply of reference books is fair, even of some we have too many copies. We are getting Sh. 3,000 from the British Council for books. The library is open until 2:30 p.m. and sometimes at night. It's not a good place to study.

Mlingano - The library is small and very poorly stocked.

Morogoro - Books are in short supply. The room is small -- just two tables. There is one library assistant and a helper. It is used a lot.

Mtwara - Poorly stocked but fair in size.

Nyegezi - Poorly stocked but large room.

Tengeru - The room is large. The book supply is fair. There is a library assistant.

Ukiriguru - The size is adequate, the content is fair, it is well used, but there is no trained staff.

Uyole - It is not good. Too small. We have about 1500 books. We now have a librarian. We plan to join ours with the research library.

5. How much land does each student need? (Principals - a summary)

The responses obtained were: 1/4 Ha., 1/2 Ha., over 5 Ha. for Agro-Mech Diploma students, 30 sq. ft. per retraining student, and "it varies according to what course one is teaching."

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6. In what ways and to what degree does inadequate transport reduce the effectiveness of training? (Principals - a summary)

All principals felt their transport was inadequate; however, it varied from almost no vehicle running at some MATIs to several at others. The feeling throughout was that inadequacy of vehicles, parts, and petrol caused many problems. Students seldom got to take even short field trips, staff were unable to properly supervise village work, administrators spent a lot of time waiting for a vehicle to come, students couldn't get to a hospital in a timely manner, bursars couldn't get to the bank, etc. At Mtwara, a study team member was carried by a large bus because it was the only vehicle running.

E. TEACHING STAFF

See Exhibit 6 for the type and number of tutors at each MATI, teaching loads, etc.

1. How many tutors are absent today?

NOTE: This question was asked to find absenteeism's effect on teaching loads. The tutors absent might have been on MATI business elsewhere or sick.

At 7 MATIs, a total of 20 tutors were absent, or 10% of those who could have been present. This figure is probably smaller than normal because MATIs were engaged in final examinations, and all leave had been cancelled by government order. Some principals said that approximately 20% of the tutors are normally away from the MATI on a given day. Then their teaching loads fall onto others present.

2. How many hours per week constitute an appropriate teaching load? (Principals)

Responses: (1) 20; (2) 20; (3) 20 is too high when one has other

[redacted] [redacted]

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duties; (4) 15 - 16; (5) 16 - 20 but less for new teachers; (6) 10 - 15 and up to 20, plus assistance with Practicals; (7) a B. Sc. holder should have 12 hours of theory and 8 hours of Practicals; (8) 20 hours of Practicals alone or some combination of between 6 - 10 hours of theory and 6 - 9 hours of Practicals.

F. STUDENTS

1. What quality of students are you getting and are there specific academic deficiencies? (Principals)

- The certificate students are appaling. The Diploma students are better. Certificate students have very poor command of English and they are getting worse.
- Certificate students are very poor; the majority are Form IV failures. The Diploma students are fairly good.
- Our Certificate students are fair. The '78 intake is better than the '77 intake.
- Among "retraining" students, the recent graduates of secondary schools are best. The Diploma students are fair in ability; all are weak in language and math.
- The Certificate students are very weak, especially in science. We (Agriculture) are getting 4th or 5th choice after the Health, Education and other Ministries.
- Even our Diploma students are weak. They and Certificate students are weak in English and math.
- We have some poor students in Agro-Mech Diploma course. There weren't enough to select from. The Farm Management students are fairly good, but all students are weak in math and English.

2. What are the solutions to recruitment of weak students? (Principals)

- Recruit from Ag-biased secondary schools.

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[redacted]

- Offer a one-month refresher course before entry into regular coursework.
- Put math and English into the syllabus or give a 1 - 2 month pre-course refresher.
- See the 1978 training conference papers from Ukiriguru and Tengeru on this topic.
- Get more Agro-Mech applicants or reduce the number of students to be selected. One should cull out 50% during selection. We could try to get Form VI leavers to enter.

3. How receptive are the students to training and to MATI discipline?
   - Good - 2 responses
   - Fair - 1 response
   - Most are very good though they complain of too much work.
   - The Diploma students especially are very serious.
   - Diploma students are quite good. Some Certificate students are not serious in Practicals; discipline has gotten better since we have gotten tough from the beginning.
   - Diploma students are O.K. Some retraining students lack interest.

TABLE 1

SIZE OF FARM AND LIVESTOCK ENTERPRISES AT THE MATIS VISITED (APRIL 1979)
(Estimates by Principals, generally without checking their records)

MATI	LAND	HORT. UNIT	DAIRY	PIGGERY	POULTRY	SHEEP & GOATS	OTHER**
ILONGA	50 Ha.	Yes	80 cows	7 sows	?	50	
MLINGANO	58 Ha. in crops	Yes, a small one	8 cows*		150		
MOROGORO	35 Ha.	.4 Ha.	35 cows	35	300		
MTWARA	79 Ha. Tillable	?	-	8	300		Beef herd, 50
NYEGEZI	214 H. Half Arable	Some	50 cows	230	771	120	Oxen, 6
TENGERU	397 Ha. Arable	Yes	200 plus	100 plus	400-1000		
UKIRIGURU	213 Ha. for Production		91 milking	about 90	974	111	Oxen, 10; Ducks, 14 Rabbits, ? and Donkeys, ?
UYOLE	30 Ha. plus Ag. Center Land	4 Ha.	600 (UAC's)	large	600		Horses (UAC) Beef Herd (UAC)

* The MATI also uses the dairy of the Research Center.
**Most MATIs probably have a few oxen, ducks, and rabbits. The principals may also have overlooked the few sheep and goats they have. All are also thought to have a horticulture unit.

RESPONSES TO QUESTIONNAIRES BY MATI TUTORS

In April and May of 1979 the Survey Team visited 8 of the 12 Training Institutes operated by the Ministry of Agriculture. At the 8 MATIs, 167 teachers (tutors) completed self-administered questionnaires, providing the substance of this section. The 167 tutors represented about 67% of the total who were assigned to and lived at the MATIs visited. The sample was based on tutors available. See Table 1 for data covering all MATIs and all staff in the system.

To the Survey Team's surprise, the major differences found in responses were those among MATIs, rather than those among academic degrees held. So large were these differences that it has been a temptation to display all data by MATI. We have shown some individual MATI data but have refrained from doing so completely because of assurances given at MATIs during interviewing that our interest was in responses from the MATIs collectively, or in the broad issues in general, not in evaluations of individual MATIs.

Administrators, staff, and students were most cooperative and we believe, candid. The study team is sending each principal rather complete displays of data from their MATIs as a feedback to them.

The 167 tutors who answered the questionnaire included:

	Number	Percent	
Master of Science degree holders[1]	15	9	(11 expatriates)
Bachelor of Science degree	43	26	(4 expatriates)
Diploma degree holders	70	42	
Certificate degree holders	39	23	
TOTAL	167	100	(15 expatriates)

[1] Includes 2 Ph. D's, one bestowed by a country in which the degree is thought to be equivalent to the M. Sc. degree.

The number of tutors completing questionnaires by MATI were as follows:

MATI Ilonga - 24 out of 26 tutors assigned and on site

MATI Mlingano - 14 out of 16 tutors assigned and on site

MATI Morogoro - 14 out of 21 tutors assigned and on site

MATI Mtwara - 14 out of 18 tutors assigned and on site

MATI Nyegezi - 26 out of 38 tutors assigned and on site

MATI Tengeru - 24 out of 52 tutors assigned and on site

MATI Ukiriguru - 17 out of 33 tutors assigned and on site

MATI Uyole (Mbeya) - 34 out of an estimated 47 tutors assigned and on site.

The questions which follow are written exactly as they appeared on the questionnaire form. The graduate degree (Grad) category used throughout refers to a combination of B. Sc. and M. Sc. degree holders.

Values for the "all tutors" categories found throughout this section are weighted averages, dependent upon the number of individuals in each sub-category; therefore, these values may differ from the simple sub-category averages.

Q. 1. What percentage of your time is spent in actual theory and practicals teaching activities?

	Tutors Responding to Each Category of Time Expenditure by Level of Education			
	Graduates	Diplomas	Certificates	All Tutors
0 - 19%	2%	4%	3%	3%
20 - 39%	17	6	8	11
40 - 59%	20	26	24	23
60 - 79%	41	42	47	43
80 - 100%	19	21	18	20

Comments on Q. 1.

Over one-third of the tutors estimated that they spent less than 60% of their time in teaching activities. Proportionately more B. Sc. and M. Sc. holders fell into the 20 - 39% range of time spent teaching, probably because it is from these ranks that the Coordinator of Studies, the Warden, and the department heads tend to be selected. However, less well-trained tutors may be assigned to duties such as managing a dairy or poultry unit and thus do little teaching.

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Q. 2. What are the most important problems that most limit the quality of your teaching (theory and practicals)?

NOTE: The categories which follow Q. 2 and Q. 3 were made by the writers from the narrative comments of tutors.

	No. of Responses
Shortages	(189)
Shortages of reference materials (books, etc.)	63
Shortages of supplies and equipment	50
Shortage of facilities (labs, etc.)	36
Shortage of training aids	24
Shortage of transport	13
Shortage of specimens	2
Lack access to equipment	1
Teacher-Related Problems	(50)
Too much work, a lack of time, or tutors are too few	27
My lack of teacher training	14
Too many extra-curricular assignments	3
I don't like teaching	2
I am teaching out of my field	2
Practicals are too brief	1
Personal conflicts	1
Student-Related Problems	(34)
The students are weak in academic ability	12
The students have poor English skills	7
Student disinterest or poor motivation	7
The students have weak backgrounds	6
Too much variation in student ability	2
Curriculum-Related Problems	(11)
The syllabus is too vague or undetailed	5
The syllabus is inappropriate	4
The syllabus is too long	1
The academic term is too long	1
Standard practicals are not established in the field	1
Other	
Headquarters inefficiency	1

Comments on Q. 2.

In summarizing, one could say that the tutors interviewed were most concerned about shortages of reference materials, supplies, equipment and facilities. Secondly, they felt they needed less work assigned and more professional training. Thirdly, tutors felt that student selection needed to be improved. In the master data display, no major differences were discernable to the writers among responses of Graduates, Diploma and Certificate trained tutors, nor among the tutors representing various MATIs.

Q. 3. Can you suggest solutions for each of the problems mentioned in Q. 2 above?

	No. of Responses (133)
Shortages	
Increase the supplies and equipment (or their budgets)	32
Increase the books and other reference materials	30
Obtain more relevant books and other reference materials	17
Equalize facilities and equipment among the MATIs	15
Provide the training aids needed	13
Allocate supplies and equipment on a per pupil basis	6
Provide more funds	5
Build the necessary laboratories	4
Tutors should collect more specimens	3
Cooperate more with the Faculty of Agriculture and others	2
Provide tutors with KILIMO-written materials	2
Headquarters should first provide facilities and equipment and only then start a new course	1
Make irrigation water available	1
Decrease the number of MATIs (and thus have more equipment and funds)	1
Keep machinery better repaired	1
Teacher-Related Problems	(46)
Provide more scholarships for further study	15
Give us teacher training (methodology)	11

	No. of Responses
Increase the number of staff at this MATI	8
Confine teaching assignments to ones own field	4
Allow tutors to work in the area of their interest	2
Have extra-curricular activities assigned to non-teaching staff	2
Have practicals taught by a different tutor	1
Administrators should equalize teaching duties	1
Change the timetable	1
Limit the number of students taken in	1
Student-Related Problems	(23)
Select students on the basis of their academic ability	13
Emphasize English instruction in secondary schools	4
Select students who are interested in agriculture	3
Motivate the students	1
Don't leave people in the field too long before diploma training	1
Provide prerequisite courses (before regular course training) to prepare students in science, etc.	1
Curriculum-Related Problems	(23)
Revise the syllabus and detail it	8
Develop tutor guides	3
Increase the length of the certificate course	3
Increase the length of the retraining course	2
Conduct more field trips	2
Make the academic terms shorter	1
Make the nutrition topic (Certificate course) a full paper	1
Other	
Headquarters limit itself to setting general policies only	1
Improve communications with Pamba House (Headquarters)	1

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Comments on Q. 3.

Responses to Q. 3 are somewhat disappointing in terms of providing creative suggestions for making limited resources go further.

Q. 4. In theory teaching (classroom teaching), do you use teaching methods other than lecture? Yes____ No____

If you ticked yes, what are the teaching methods and how much were they used (in percentage of time)?

NOTE: Where respondents marked yes but showed only training aids were used, the investigators rejected these as "other teaching methods" and made a "NO" entry. 144 tutors responded to this question as follows:

Respondents (by degree held) who reported using teaching methods other than lecture

Grad	Diploma	Certificate	All Tutors
55%	59%	15%	49%

Respondents, by MATI, who said they used methods other than lecture

Mlingano	64%
Ukiriguru	59
Morogoro	55
Nyegezi	50
Tengeru	47
Uyole	47
Ilonga	45
Mtwara	20
Average of all tutors	49%

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The following additional teaching methods were said to be used:

(Respondents - 144)	Respondents who said they use other methods	Ave. % of time the method was said to be used by those who did use the method
Demonstrations	17	19
Questioning or discussion	16	19
An "all others" category	12	15
Films or movies	9	15
Field trips	7	25
Home work	3	30
Testing	2	15

NOTE: To clarify matters, the previous table shows 16% of tutors said they use questioning. These tutors said they use it 19% of the time.

Comments on Q. 4.

Films can be classified as a teaching method as they can replace other methods and can fill an entire period. Testing is a good teaching method, used by all, but only a few listed it.

The responses to this question give reason to doubt their validity. Many respondents seemed confused about what a teaching method is. And Certificate-holding tutors probably showed a low percentage use of non-lecture methods because few of them teach theory. Still, we can see that over half of the better-educated staff (who do most of the theory teaching) felt they sometimes use non-lecture methods of which questioning and demonstrations are said to be most used. Even when non-lecture methods were used by certain tutors, they weren't used heavily. An absence of individual assignments, project assignments, role playing, the use of case studies, and problem solving exercises is noted.

The variations among MATIs in percentages of "other methods" said to be used are surprising (not displayed). MATI Mlingano's higher use could reflect a lengthy series of teaching methods seminars held there.

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Q. 5. When you develop your notes for theory classes, what percentage comes from each of the following sources?

	TUTORS USING EACH SOURCE BY EDUCATIONAL LEVEL				AVERAGE % OF NOTES COMING FROM EACH SOURCE LISTED WHEN USED BY EDUCATIONAL LEVEL			
	GRAD Holder	DIP Holder	CERT Holder	All Tutors	GRAD Holder	DIP Holder	CERT Holder	All Tutors
Notes from your own previous coursework	86%	99%	74%	89%	27%	44%	43%	38%
Notes taken from reference books	95	97	64	89	39	34	29	35
KILIMO written materials	68	74	59	69	10	12	15	12
Personal knowledge	93	90	59	84	21	16	12	17
Other (Explain)*	65	63	41	58	11	7	9	9

*These included radio, newspapers, visits with professionals, farmers and other tutors.

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Comments on Q. 5

To be sure that you, the reader, understand the table, try this example. It shows that 89% of all 167 tutors questioned used their previous course-work notes in compiling their present class notes. It also shows this group constructed an average 38% of the volume of present class notes from coursework.

Previous course notes, reference books, and personal knowledge were said to be used by more tutors as sources for class notes than were other sources. The first two of these sources were sid to have contributed most to the tutors' class notes (38% and 35% = 73%).

It is interesting to note that Graduate degree holders said they incorporate less old course notes and a bit more personal knowledge and information from other sources such as newspaper, radio, and personal contact into their class notes than did the Diploma-degreed tutors. Again, the data probably are useful only as a very crude estimation of the situation.

Q. 6. If a "tutor's guide" were prepared for your subject matter area by a committee of experts and topic tutors, which could be used in all institutes, this would be:

	Respondents by Degree Held			
	GRAD	DIP	CERT	All Tutors
Very useful to me.	35%	51%	49%	45%
Somewhat useful to me	42	39	41	40
Probably not used by me	23	10	11	15

Comments on Q. 6

Diploma and Certificate-degreed tutors expressed more favorable opinions about the usefulness of "tutor guides" than did Graduate degree holders. About 90% of these two groups, as opposed to 77% of Graduate-degreed tutors said the guides would be very or somewhat useful.

Q. 7. Would you like to have time to prepare a tutor's guide for yourself?

Responses Regarding Interest in Preparing a Tutor's Guide

	GRAD	DIP	CERT	All Tutors
Yes	82%	82%	74%	80%
No	18	18	26	20

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Q. 8. How can theory teaching be improved at this MATI? (The categories following were developed by the interviewers from the tutors' narrative responses). For brevity, some less useful single respondent comments have been omitted from both Q. 8 and Q. 9.

	No. of Responses
Provide the staff with the necessary reference materials	51
Upgrade the staff in knowledge (further training and workshops)	31
Provide teacher training	23
Use more training aids	18
Revise the syllabus or detail it	7
Make the classes smaller	6
Provide more tutors	6
Provide tutor guides	6
Conduct study tours or field trips	5
Make handouts (mimeographed notes) for students	5
Enroll better qualified students	5
Make the course longer	3
Decrease the tutors' workload	3
The tutor must have a higher degree than the students	3
The tutors should have extension experience	2
Provide more preparation time	2
Tutors should teach only in their field of expertise	2
Use more guest speakers	1
Obtain reports from extension workers	1
Exchange more information with researchers	1
Exchange information with tutors in other MATIs	1
Use the discussion method	1
Conduct more seminars	1

Comments on Q. 8

Tutors seemed to see potential improvements as being mostly outside of their own ability to remedy. The physical problems expressed are, and will to some degree, continue to be a stubborn reality. Responses might

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have included: use discussion, problem-solving, and demonstration methods; conduct more seminars, use specimens more; develop good plans for lessons; and supervise junior staff better. The pattern of suggestions varied little among the MATIs.

Q. 9. How can practicals best be improved at this MATI?

	No. of Respondents
Increase the facilities, equipment and supplies needed	85
Assign more or better-qualified tutors	18
Conduct more field trips and tours	18
Provide more reliable transport	14
Make our practical groups (classes) smaller	12
Make the practical periods longer	9
Provide audio-visual aids	7
Plan better for practicals	5
Provide intensive student practice	4
Increase the land available	4
Upgrade the tutors via training	4
Tutors must first learn the skills themselves	3
Tutors should relate practicals with theory	3
The staff must be specialized	3
Increase reference books	3
Decrease the tutor workload	2
Send students to villages	2
Students should demonstrate to each other	1
Give tutors appropriate shortcourses	1
Emphasize demonstrations	1
Involve research staff	1
Place the MATI near a ranch (for Ranch Management)	1

476

Q. 10 On the average are the Certificate students you teach:

(Total Number of tutors - 156)	% of Tutors
Very good academically	9%
Good academically	28
Fair academically	46
Poor academically	14
Very poor academically	3

Where there is poor academic performance, please describe:

(an open question)

	% of Tutors
Poor selection	8%
Weak in English	6
Poor background	5
Weak in sciences	2

Comments on Q. 10

In spite of many comments being heard about poor Certificate student ability, the respondents here indicated that the quality is a bit above "fair" on the average.

Three MATIs showed considerable deviance in tutor response. At one, 23% said certificate students are poor, and 13% said they are very poor academically. At the second MATI, 25% said the students are poor. In contrast, 27% of the tutors in a third MATI said the students are very good.

No major differences were found among Graduate degree, Diploma, and Certificate holders.

The second part of the question was often left blank.

Q. 11. The exchange of information between staff and administration within your MATI is:

	Response of tutors by degree held			
	Graduates	Diploma	Certificate	All Tutors
Very good	11%	10%	13%	11%
Good	38	41	54	43
Fair	30	30	18	27
Poor	21	19	15	19

263

Comments on Q. 11

Tutors rated information flow in the MATI system between good and fair on the average. Certificate holders rated it slightly higher than did other staff. There was considerable variation among MATIs in this respect.

Q. 12. How can the exchange of information be improved? (relates to Q. 11)

	No. of Responses
Through the use of regular staff meetings	33
By increasing contacts between the 2 groups	9
By passing circulars	7
By discussions	7
By administrators being fair and open	6
By administrators taking staff advice seriously	6
By planning and announcing plans early	5
By involving staff in decision making	5
By administration reducing the bureaucracy	3
By using a suggestion box	3
By supervising the administrators	3
The staff should meet each day in a coffee room	2
By headquarters giving prompt replies	2
By improving coordination between departments	2
By changing administrators	1
By getting rid of confidential files	1
Discipline messengers to get information circulated quickly	1
Conduct department meetings	1
Locate all staff in one building	1
Provide telephones	1
Administrators inform staff what is going on	1
Transfer tutors every 2 years	1
Improve the social facilities	1

Q. 13. How many times in the last 12 months have you contacted the following people in order to obtain or exchange agricultural information?

	Tutors making contacts				Ave. No. of Contacts Reported by those Reporting		
	GRAD	DIP	CERT	All Tutors	GRAD	DIP	CERT
Agricultural Officers	54%	46%	41%	47%	5	4	5
Researchers	68	41	36	49	5	4	4
Persons having Tanzanian printed matter	32	21	23	25	5	4	6
Village manager or Bwana Shamba	32	27	26	28	5	4	3
Others (list)	37	24	18	27	8	5	6

Comments on Q. 13

Approximately half of all tutors reported having contacted Ag. officers and researchers during the past year (an average of 5 and 4 times). In total, the 167 respondents reported 1355* contacts with information carriers. Due to the many unfilled and wrongly filled forms, due to the very subjective nature of the estimate, and due to the unknown motivations of respondents, it is wise not to draw rigid conclusions. There was an indication that some tutors are quite active in reaching out for information and others are very inactive. MATI Ukiriguru tutors reported about 50% more contacts than did tutors at other MATIs on the average. Graduate tutors reported the most contacts.

Q. 14. List the duties as you understand them, of a village level field worker (Bwana Shamba). (The categories were constructed by the writers during tabulation)

	No. of Responses
To advise farmers	51
To teach farmers better agricultural methods	29
To serve as a link, bridge or coordinator between farmers and research	16
To demonstrate to farmers	13

* Excludes those contacts identified by vague responses such as "some" or "many" rather than by a specific number, as called for.

	No. of Responses
To supervise agricultural activities	12
To help people to achieve food production (or to farm better)	10
To assist farmers in using new methods	7
To survey problems and identify solutions	6
To plan	6
To disseminate ag research information	5
To distribute fertilizer, seed and other inputs	5
To assess ag projects	4
To teach better nutrition or better ways of living	4
To show by doing	3
To advise farmers on better ways of living	3
To conduct seminars	2
To advise village managers	2
To follow up on recommendations made	2
To evaluate progress of the villagers	2
To involve the people in carrying out programs	2
To measure land	2
To serve as a contact between government and farmers	2
To conduct experiments	1
To obtain expert advice	1
To cooperate with party leaders	1
To treat livestock diseases	1

NOTE: Some single responses have been dropped to save space.

Summary of Q. 14

The reader may feel that some of the responses have essentially the same meaning and perhaps they do. But, in that advising, teaching and helping a farmer, for example, have quite different meanings in Extension. They are separately maintained.

The duties listed were rather inclusive and mostly legitimate; however, the 51 responses "to advise farmers" are worrisome. Teaching is normally thought of as a process designed to bring about a change in

behavior (practice). Giving information (advice) is often one of many activities or steps needed to obtain the adoption of a new practice.

In the display of data, no variations in response pattern were readily visible among tutors holding various academic degrees, nor among tutors from different MATIs.

Q. 15. How much do you like teaching?

	Tutors by educational level			
	Graduates	Diploma	Certificate	All tutors
Very much	46%	41%	59%	47%
Somewhat	15	36	22	26
Not very much	27	14	16	19
Not at all	12	9	3	8

The proportion of tutors at each of the 8 MATIs surveyed who responded either "not at all" or "not very much" varied from a low 7% at MATI Mtwara to as high as 43% at other MATIs.

Comments on Q. 15

Nearly half of all tutors responding said they like teaching very much and three-fourths liked it "somewhat" to very much. The remaining one-fourth may need some professional help or transfers to other duties. Graduates were least content and Certificate holders most content with teaching (39% and 19% respectively indicated liking teaching "not at all" or "not very much").

Perhaps the most surprising finding in these data was the high response variation among tutors at various MATIs. The response pattern is not consistent with patterns from questions on communications among staff, quality of students, desire to teach elsewhere, and teaching in ones specialty area, all of which would be expected to correlate with morale.

Q. 16. Would you rather teach elsewhere? Yes_____ No_____

	Tutors responding by educational level			
	Graduates	Diplomas	Certificates	All Tutors
Yes	43%	48%	54%	48%
No	57	52	46	52

If you ticked yes, please tick important reasons why:

267

	Tutors Responding*
I have been here for many years	19%
Poor institutional administration	17
My family is in another region	7
I don't relate well with the staff	2
I am overworked here	4
Other (list)	
Future not bright here	3
MATI not suited for my specialty	1
Miscellaneous reasons	2

*Out of the total of 157 respondents to Q. 16

The proportion of tutors desiring to teach elsewhere ranged from 17% to 100% among MATIs.

Comments on Q. 16

Almost half of all tutors questioned would rather teach elsewhere. Certificate holders were most and B. Sc. holders least desirous of moving elsewhere (54 and 43%). The main reasons given were that they (tutors) "have been here too long" or "the administration is poor".

The desire to transfer appeared to relate heavily to the isolation of the MATI and to the overall quality of life that is possible at the site. MATI Uyole tutors were somewhat of an exception. Their desire to transfer may have related to the MATI's involvement with the Uyole Agriculture Center, a parastatal which pays its researchers higher salaries than tutors receive, and leaves many decisions to Center Committees.

Q. 17. Would you prefer to be assigned agricultural duties rather than teaching? Yes_____ No_____

	Tutors responding by degree held			
	Graduates	Diplomas	Certificates	All Tutors
Yes	41%	46%	33%	41%
No	59	54	67	59

If you ticked yes, please tick important reasons why:

482

	Tutors Responding*
I am not interested in teaching	12%
I am poorly prepared for teaching	8
Health reasons	4
I am overworked as a teacher	8
Other (list)	
I want varied experience	11
There are no incentives	2
Frustration	1
Poor status of teaching	1
Miscellaneous	1

*Out of a total of 164 respondents to Q. 17

The proportion of staff preferring "duties other than teaching" varied from 16% to 62% among MATIs, an exceptionally big difference.

Comments on Q. 17

About 6 tutors out of 10 questioned preferred not to be assigned agricultural duties other than teaching. Certificate-holding tutors were more likely than Graduates and Diplomats to prefer no change.

Again, the wide variation among tutors at different MATIs in desire to change work assignments was surprising. In some cases the responses seem inconsistent with earlier responses. For example, a high 93% of the respondents at Mtwara and Mlingano said they like teaching somewhat or very much, yet 43% and 57% of them wished to change their work. At Mtwara, perhaps this is seen as an escape route from the region. Herein lies a major risk in social research, not knowing what one is really measuring.

Q. 18. Are you teaching some or all of your classes in your area of specialization?

	Tutors responding by degree held			
	Graduates	Diploma	Certificate	All Tutors
Yes	69%	70%	65%	69%
No	31	30	35	31

Tutors Who Reported Teaching No Classes in Their Area Of Specialisation - By MATIs

Tengeru	52%
Mtwara	50
Mlingano	31
Ukiriguru	29
Nyegezi	27
Uyole	24
Ilonga	23
Morogoro	23

Comments on Q. 18

The responses imply that the knowledge and skills of a large number of tutors are being wasted through disuse of their specializations. One still does not know whether the 31% of tutors teaching all of their classes out of their speciality area, are completely unprepared to teach what they teach or whether they are teaching in an area of minor expertise. (See Q. 19).

Again, the variation reported among MATIs is very large. Administrators at Headquarters and at MATIs may wish to see if they can make improvements in teaching assignments.

Q. 19. Are you teaching in areas for which you were not prepared?

Yes_____ No_____

	Tutors Responding by Degree Held			
	GRADUATE	DIPLOMA	CERTIFICATE	ALL TUTORS
Yes	31%	33%	24%	30%
No	69	67	76	70

Tutors who said they are teaching in areas they are not prepared for (by MATI)

Ilonga	42%
Mtwara	36
Uyole	36
Ukiriguru	33
Tengeru	29
Mlingano	23
Nyegezi	23
Morogoro	7

If you are teaching outside of your areas of preparation, tick as many of the reasons why as apply:

	Tutors Responding*
There is not enough staff here	15%
There are no qualified staff in those areas	13
I am interested in the field	4
The administration is not aware of my lack of preparation	4
Other (list)	2

* % of the 162 tutors responding "yes" or "no" to Q. 19.

Comments on Q 19

A high 30% of all tutors responding to the question said they were teaching in areas in which they were not prepared or supposedly had no training. A perceived lack of preparation by tutors occurred less frequently among Certificate holders than among Graduates and diploma holders.

One would expect more teaching to be outside of areas of competency in small MATIs where the breadth of the Certificate curriculum, for example, is the same as at a large MATI. Thus MATI Mtwara and MATI Ilonga fit the expectation while MATI Uyole and MATI Ukiriguru did not. According to the tutors sampled, the strictly specialized MATIs such as Morogoro (except for retraining), Nyegezi and Mlingano, were, and would be expected to be less troubled by misallocation of teaching duties.

Q. 19 has implications for the allocation of staff members to MATIs by Division Headquarters.

Q. 20. How adequate was your orientation when you first joined this institution?

	Tutors responding
Very adequate	29%
Partially adequate	44
None given	27

Comments on Q. 20

The responses by MATI varied little from the averaged percentages above.

At each MATI, some tutors said they had received "very adequate" orientation while others said they had received "none". Perhaps tutors not only have different expectations but may also have defined the term "orientation" differently.

On the average, tutors implied that better orientation is needed.

Q. 21. What short courses have you taken? How useful were they?*

Short course taken	No. of Tutors	Ave. Duration (in weeks)	Usefulness (No. of respondents) Very	Some	None
Teacher training (methods)	31	3	25	5	1
Political education	5	12	4	1	-
Dairy	4	24	4	-	-
Political economy	3	7	3	-	-
Artificial insemination	3	11	2	1	-
Audio visual	3	12	2	1	-
Food science	2	32	1	-	-
Farm management	2	12	2	-	-
Draft animals	2	3	1	-	-
All others	14	-	-	-	-

* Excludes expatriate tutors

Q. 22. What short courses do you now feel would enable you to teach your topics better?

	No. of tutors
Teacher training or teaching methodology	40
Training in area of specialization (unnamed)	9
Crops	7

223

	No. of tutors
Study tours (miscellaneous types)	7
Animal husbandry	6
Pig husbandry	4
Agro-mechanics	4
Nutrition (probably human nutrition)	4
Dairy science	3
Poultry husbandry	3
Audio visual	3
Ag mechanic study tours	3
Extension	2
Animal breeding	2
Repair and maintenance of farm machinery	2
Farm management	2
Range management	2
Soil and water management	2
All others	24

Q. 23. Please tick the positions in which you have previously served.

	Total No. of tutors	% of tutors who served (by degree held) GRADS	DIPLOMAS	CERTIFICATES	ALL TUTORS
Administration-Ministerial level	13	12%	6%	5%	8%
Administration-Regional level	15	17	4	5	9
Administration-District level	13	9	7	3	8
Research	25	17	14	13	15
Seconded to parastatals	25	17	16	10	15
Seconded to other Ministries	9	10	1	5	5
Extension service	33	14	26	18	20
Other (list)	21	16	10	13	13
TOTAL transfers	154				
Ave. No. of transfers per Graduate, Dip., Cert. holder and overall		1.12	.87	.72	1.08

* % of the 167 potential respondents

481

Comments on Q. 23

Twenty percent of all tutors surveyed indicated they had had Extension experience. Fifteen percent had worked in research and the same percent had been seconded to parastatals. Graduates surveyed indicated an average of 1.12 previous positions, compared to .87 and .72 for Diploma and Certificate holders.

As some people had held 2 or more previous positions, others obviously had held none. In going back through the forms for each tutor, it was found that 49% of all tutors did not indicate having held previous positions other than teaching.* These figures would be expected to be inflated by about 5% due to their inclusion of about 10% non-respondents among whom about half may have had previous experience. These inexperienced tutors may need experience substitutes to perform well as tutors.

* Breaking this overall figure down, we find that 45% of the Graduates, 53% of the Diplomates, and 49% of the Certificate holders did not indicate having held previous positions, other than teaching.

APPENDIX _____. RESPONSES FROM RECENT GRADUATES IN EVALUATING THEIR OWN TRAINING.

As a means of evaluating the quality and type of agricultural training and education ongoing in the various institutions in Tanzania, the survey team interviewed all available people who had graduated from such institutions within the past 3 years. The persons interviewed were posted as follows:

District Offices . . .	53
Regional Offices . . .	39
Parastatal Sector . . .	16
Research	9
Ministry Headquarters .	8
Village	1
Private Sector	1
TOTAL	127

The respondents' highest level of education as reported was:

BSc	38
Diploma	63
Certificate	24

The respondents' general field of study was reported as:

Livestock	35
Crops	34
Both	56

The following questions appear exactly as they did on the field questionnaire.

826

Question 1. Please evaluate the quality of your most recent (Certificate/ Diploma/B. Sc.) training by placing a tick under the appropriate column, with regard to: (Number of responses from 127 people interviewed).

	Very Well Trained	Well Trained	Adequately Trained	Poorly Trained	Very Poorly Trained
a) Theoretical knowledge:	49	65	12	0	0
b) Ability to apply skills & knowledge practically:	18	59	42	5	0
c) Values, habits & attitudes which are conducive to productive work:	13	60	45	6	0
d) Administrative skills & knowledge :	12	28	60	21	1
e) Planning skills:	10	49	53	8	1
f) Knowledge and skills of supervision & management:	16	43	56	7	0
g) Ability to extend knowledge and skills to farmers:	26	42	49	4	0
h) Knowledge & ability to apply economic principles:	12	43	58	8	1

490

Question 2. How have you overcome weaknesses in your training?

By asking advice from better trained	28
By reading and reference books	18
By learning through experience	16
By working hard	10
By taking correspondence courses	8
By personal initiative	5
Through the news media	2
Through on-the-job training	2
By practicing	2
Through short courses	2

Question 3. In which subject areas, if any, were you poorly trained?

Livestock production	11
Administration	9
Crop production	7
Applying economic principles	6
Surveying	6
Rural economy	6
Veterinary science	5
Soil science	5
Agromechanics	5
Extension	4
Statistics	3
Land planning and management	3
Irrigation	2
Planning	1
Horticulture	1
Meat processing	1
Political education	1

Question 4. How do you think your training could be improved?

More practicals than theory	37
More study tours and field practicals	36
By short courses	24
More and better tutors	9
Longer courses	3
Better workshops and equipment	3
Better library facilities	3
More specialization	2
Improve facilities	2
More agricultural extension and administration	2
More use of visual aids	2

Question 5. Based on your recent job experiences, please indicate your opinion regarding changes in emphases needed in training by placing a tick in the appropriate column:

Theory and Practicals	Much More	Some More	About the Same	Some Less	Much Less
a) Crop Science	47	18	19	4	2
b) Horticulture	30	31	16	5	3
c) Soil Science	37	26	22	2	3
d) Surveying	28	33	22	4	1
e) Forestry	10	10	10	7	10
f) Bees & Fisheries	9	9	17	5	15
g) Workshop Technology	23	28	9	9	6
h) Oxen Power	33	30	14	3	3
i) Anatomy & Physiology	10	26	35	4	5
j) Animal Improvement	39	21	29	2	1
k) Phys. of Growth Lact Eggs	11	15	23	7	6
l) Animal Nutrition	21	24	32	2	4
m) Poultry Husbandry	24	31	27	3	2
n) Beef Husbandry	21	28	31	4	3
o) Farm Economic Org.	43	24	25	4	2
p) Agric. Extension	43	24	28	2	1
q) Administration & Legislation	30	42	15	3	2
r) Human Nutrition	15	20	28	3	10
s) Soil Conservation	39	33	20	0	1
t) Small Scale Irrigation	32	34	12	5	1
u) Tractor Power	27	30	25	4	2
v) Other Farm Power	21	29	26	5	3
w) Dairy Husbandry	17	30	31	2	2
x) Path., Micro., Proto., & Para.	19	14	25	6	8
y) Major Livestock Diseases	36	22	25	2	3
z) Poultry Diseases	21	32	25	2	3
aa) Clinical Studies	34	19	13	4	9
bb) Animal Industry (meat insp)	19	29	19	2	7
cc) Range and Pasture Mgt.	21	30	32	1	4
dd) Pol. Ed. and Pol. Econ.	24	26	39	5	3
ee) Farm Structures	24	33	30	4	5

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APPENDIX A-IX THE UNIVERSITY OF DAR ES SALAAM, FACULTY OF AGRICULTURE, FORESTRY AND VETERINARY SCIENCE.

SURVEY PROCEDURE

Opinions and statistics were obtained by personal interview and by self-administered questionnaire.

Approximately two hours were given to each interview. A generalized set of questions and problems were discussed. Questions asked related either to the entire Faculty or to specific divisions or departments.

Those interviewed at the Faculty level were the Dean, the Associate Dean and former Dean and nine heads and directors at the departmental level.

Questions discussed concerned problem areas related to the general faculty situation; and those specifically related to the departments and divisions. Future plans for the faculty and departments, individual staffing needs, facilities, student members, teaching and research equipment, testing procedures, strengths and weaknesses and the finance situation were discussed. Other questions were discussed which may or may not appear in this report.

Two self-administered questionnaires were distributed to lecturers and students but unfortunately not all students and lecturers were present and not enough time was available to contact all groups and have the questionnaire returned.

Of the 74 staff members presently assigned to the campus, 25 completed the questionnaire. This does not represent a measured sample of each department. The student situation was very similar. Students were contacted where available. No student questionnaires were returned from the Veterinary Science Division. Only 66 responses were received from a total of 265 students.

The results of the questionnaire therefore are only used in a general way and a statistical situation is not developed.

INTRODUCTION

History.

The University College of Tanganika as a member of the University of East Africa was officially opened October 25, 1961. The importance and urgency of University Education had been discussed by various officials in the three East African countries since 1955. At the opening ceremony of the college, the then Prime Minister, Julius Nyerere, was given an Honorary Degree in recognition of his role in leading the people to national unity and to political independence; for his wisdom, courage and foresight in high office, and for his constant endeavour in promoting the expansion of higher education in East Africa.

The Law Faculty began with 14 students in October 1961 in Dar es Salaam. In 1964 the University College moved to new facilities on Observation Hill with the opening of the Faculty of Arts and Social Sciences. The Faculty of Science was opened in 1965, the Faculty of Medicine in 1968, the Faculty of Agriculture at Morogoro in 1969, and the Faculty of Engineering and the Institute of Development Studies in 1973.

In June 1970 the University of East Africa was dissolved and in August 1970 the University of Dar es Salaam was officially inaugurated. The University presently has a student population of about 3,500 in four different faculties at the main campus in Dar es Salaam and has approximately 265 students in the Faculty of Agriculture, Forestry and Veterinary Science at Morogoro, about 170 km from Dar es Salaam.

The Faculty of Agriculture was established in July 1969 following the takeover of the former Agricultural College. During the first three years of existence, the Diploma and BSc (Agric.) programs were operated simultaneously. In 1973 the Diploma Course was discontinued.

In July 1973 the BSc (Forestry) program was initiated and in July 1976 the Veterinary Sciences program was started.

The Faculty has made steady progress in building facilities and in planning and implementing curriculum. Numerous programs have been started at the post-graduate level.

Organization and Enrollments.

The present faculty consists of three (3) Divisions: Agriculture, Forestry and Veterinary Science. The Division of Agriculture is divided into seven departments: Crop Science, Animal Science, Soil Science, Agricultural Education and Extension, Agricultural Engineering and Land Planning, Rural Economy and Food Science and Technology. Three degrees are offered at the Bachelor level: BSc (Agric.); BSc (Forestry); and the Bachelor of Veterinary Science (B.V.Sc.). The undergraduate program had an enrollment of 197 in June 1979. A summary follows:

Table 1. UNDERGRADUATE STUDENT ENROLLMENT AS OF JUNE, 1979

(FACULTY OF AG. -- MOROGORO)

COURSE	INTAKE DATES	TOTAL	MALE	FEMALE
1ST YEAR B.SC. (AGRIC.)	JANUARY 1979	42	25	17
2ND YEAR B.SC. (AGRIC.)	JANUARY 1978	45	39	6
3RD YEAR B.SC. (AGRIC.)	JANUARY 1978	16	15	1
3RD YEAR B.SC. (AGRIC.)	JULY, 1977	14	8	6
		117		
1ST YEAR B.SC. (FORESTRY)	JANUARY 1979	23	20	3
2ND YEAR B.SC. (FORESTRY)		--	--	--
3RD YEAR B.SC. (FORESTRY)	JULY 1977	18	18	0
		41		
1ST YEAR B. VET. SCIENCE	JANUARY 1979	13	11	2
2ND YEAR B. VET. SCIENCE		--	--	--
3RD YEAR B. VET. SCIENCE	JULY 1977	17	17	0
4TH YEAR B.VET. SCIENCE	JULY 1976	9	9	0
		39		
	TOTAL UNDERGRADUATES	197	162	35

Four post-graduate programs are offered at the Master level: MSc (Agric); MSc (Agric Eng.); MSc (Agric Econ.); and MSc (Forestry). A Doctor of Philosophy degree is offered in Agriculture or Forestry as well as a Doctor of Science degree. Individuals may apply for a Doctor of Science degree with a Bachelor's degree and at least 6 years standing. The Doctor of Philosophy degree normally requires a Master's degree for entry. The post-graduate programs had an enrollment of 68 students in January 1979 as follows:

TABLE 2. GRADUATE STUDENT ENROLLMENTS AS OF JUNE 1979

DIVISION OR DEPARTMENT	1ST YEAR POST GRADS 1978-79	2ND YEAR POST GRADS 1977-78	Ph.D. CANDIDATES	
RURAL ECONOMY	3	11		
SOIL SCIENCE	2	4		
CROP SCIENCE	3	3		
ANIMAL SCIENCE	5	8		
AGRICULTURAL ENGINEERING		2		
DIVISION OF AGRICULTURE			12	
SUBTOTALS	13	28	12	= 53
FORESTRY	6	13		= 19
TOTAL	19	41	12	= 72

A review of the enrollment figures for the Faculty shows a steady decline since 1974-75 (see Table 3). The latest enrollment in June of 1979 listed only 1 more student than was enrolled in 1974-5. Thus there has been a reduction of 97 students in the Division of Agriculture while 41 and 39 students respectively were enrolled (added) in the newer Divisions of Forestry and Veterinary Sciences.

TABLE 3. STUDENTS' NOMINAL ROLL (FACULTY OF AG. -- MOROGORO)

ACADEMIC YEAR	UNDERGRADUATES				POSTGRADUATES	GRAND TOTAL
	AGRIC	FORESTRY	VETERINARY	TOTAL UNDERGRADS		
1974/75	214	45	--	259	5	264
1975/76	201	51	--	252	16	268
1976/77	182	55	12	249	34	283
1977/78	84	61	29	174	53	227
1978/79	163	66	47	276	68	344
June, 1979	117	41	39	197	68	265

There appears to be several reasons for this reduction in enrollment. The number of Form VI leavers has not increased substantially, the number of mature entry students qualified to enter the faculty has nearly been exhausted, the faculty has a reputation of being rather difficult, and foreign scholarships are readily available to send students out of the country. These factors will be discussed later in this report.

Entrance Requirements.

Requirements for admission into the faculty have been changed in recent years to provide the opportunity of all deserving Tanzanians to obtain a higher education. Students may qualify for direct entry into the faculty with the proper passes and after having served one year of National Service. Others may qualify for direct entry by obtaining not less than second level passes in Diploma and/or Certificate training. Additionally, to provide the opportunity to exceptionally well-qualified people who wish to study for the first degree and who do not possess qualifications to satisfy direct entry, an alternative method of mature entry is offered. These students must be 25 years of age or older and should have completed their formal education at Form IV or Form VI; or they should have completed Form II with two years of institutional training, or the equivalent of five years prior to entry.

Administration.

Through interview of administrators, department heads, staff members and a review of administrative procedures, it was apparent that ample opportunity is provided for staff and student input into the planning process for the faculty. The Dean relies upon various academic officials to provide the leadership and expertise in the operation of the academic programs. A partial list of those included the Associate Dean, the Assistant Dean of Students, the Chief Academic Officer, the Director of

Graduate Studies, the Director of Undergraduate Studies, seven department heads and two Directors, one in Forestry and one in Veterinary Science.

The general policy of the University and Faculty stipulates that the majority of the administrators and department heads must be reviewed and appointed every three years. In some situations individuals are reappointed for the second three-year term. In general this policy provides for a general assessment and evaluation of the administrators. It was apparent that the administrators of the Faculty were dedicated and organized well enough to provide the quality of education needed by Tanzania. Students were an integral part of the policy making and planning process. They were evident in University committees and were consulted on matters of Faculty administration, curriculum development, evaluation, and other general operating procedures. This input into administrative procedures is particularly important because of the valuable experience provided by the mature students who have had several years of field experience and are familiar with current needs and difficulties in past training. The direct-entry student also has a role to play in the process, by injecting new and innovative schemes into the system.

Curriculum.

Curriculum development at the Faculty is undertaken by staff of the academic discipline involved. A review of the departments revealed that several such as Soil Science, Rural Economy, Agricultural Engineering and Lang Planning have recently been re-evaluated and changed. Several other departments have been in operation only a short time and little evaluation can take place until a number of students have passed through the present curriculum.

Major changes in the curriculum dealing with additions or subtractions of contact hours and major subject matter changes must pass through the Fa-

culty and University academic planning procedure. Curriculum development discussions were being conducted by the Faculty relative to the amount of practical training that can be offered, its relationship to self-reliance, the length of time required to obtain the first degree, the elimination of present subject matter from the curriculum and the time at which specializations should be entered into the students' programs. These and other areas of changes which affect the education of students of necessity pass through the University policy and curriculum development process.

Staffing.

Staffing of the Faculty appeared to be adequate for the number of students and other activities involved. The exception to this was in the departments of Crop and Animal Sciences. A large percentage of the students study in these two areas, especially the crop sciences, and therefore constitute the heaviest staff contact hours. These disciplines also require more time given to practical education on the farm, creating a larger workload on the farm staff and assistant tutors. A number of staff were being upgraded to MSc and PhD levels at various universities throughout the world and at Morogoro. When these staff return to the Faculty, the situation in several of the departments will improve considerably. The Crop Science Department is a good example of this situation. Approximately 24 staff were assigned to the department but only 13 were on campus at the time of the interviewer's visit.

Facilities.

Facilities available and those in the construction or planning stages in June 1979 will for some time meet the needs of the Faculty. Those facilities under construction including the Center of Continuing Education which will house the Agriculture Education and Extension staff in addition to the Center staff. A hostel will be constructed to accommodate 50 people

coming to the faculty for short programs organized by the Ministry of Agriculture and three Staff Houses will be built for Center staff.

New facilities for Veterinary Sciences are approved and will sufficiently meet the needs for that division. Another student hostel will also be built for this program, bringing the total on-campus student dormitory capacity to 535.

Twenty to twenty-five houses were also planned or are under construction and will help to alleviate the critical need for staff houses. Staff housing is a continuous problem and will still be acute even when these houses are completed. A number of staff were living in temporary houses, and those staff members who were away for further training will be returning in the next few years.

DIVISIONS AND DEPARTMENTS

A general survey of the divisions and departments throughout the faculty brought to light problems which can have an adverse effect on the quality of education received. Many issues which follow are relevant to higher education in general, rather than being issues limited to the Faculty at Morogoro. Impressions from various interviews are categorized by divisions and departments to avoid generalizations.

Division of Agriculture.

Rural economy.-- Major emphasis by the approximately six staff members in this department was limited to teaching at BSc and MSc level, and to supervision of post-graduate theses. Staff were also active in conferences, workshops and consulting services in Tanzania. Staff were adequate to cover departmental and service courses but little time was left for other types of activity such as research.

Twenty-one post-graduate students were conducting research projects throughout Tanzania and Kenya and were in various stages in writing their materials or in examinations. The teaching load for departmental staff

members averaged approximately 100 contact hours per staff member during May term 1979.

Several staff members in this department had not completed terminal degrees and therefore may be weak in research capabilities. Teaching capabilities tend to be adequate. The BSc and MSc curriculum had recently been revised and approved by the University Senate.

Reference books, periodicals, and journals are sufficient but relevant abstracts and other published works are not available.

The planning procedure in the department involves all staff since this is a small department.

Soil Science--The Department of Soil Science is engaged primarily in teaching undergraduate and post-graduate students. It has undertaken a major research program on tobacco soils in Iringa, Mufundi, and Nhombe Districts of Tanzania.

Approximately 8 staff were involved in teaching and research responsibilities. All soil science courses in the division of agriculture and forestry were offered to first and second year students. Seven students were enrolled in the third year soil science option and six students were in the post-graduate program. The staff averaged about 50 contact hours per term, excluding the courses taught in the post-graduate program. The department was adequately staffed with several staff presently obtaining their terminal degrees. Laboratories could accommodate approximately 120 students and were well equipped. The largest problem in this department as was the case in many others, was the lack of students. Due to the small number of students per intake, no students will be enrolled in Soil Science option during the 3rd year in January 1980.

Animal Science--Only four staff were housed in this division with other staff being trained to return to the Faculty. Senior staff were well qualified for both teaching and research but junior staff lacked

experience and research capabilities. One class of 48 students was taught in the 1st year and a class of 17 students was taught in the second year to Veterinary Science students. With the supervision of post-graduates, with undergraduate teaching, practical training and the research efforts, These staff were overcommitted to adequately fulfill their obligations.

Textbooks appeared to be adequate but reference books were not.

Laboratory facilities were needed for nutritional studies, while housing has been improved for goats and swine. Poultry facilities are still inadequate.

Agricultural Education and Extension--This department had been newly organized and was comprised of 6 staff members. Basic courses were taught to all first- and second-year students and a class of third-year students had just received their BSc degrees. Unfortunately this department will not offer the third-year option in January 1980 because of the scarcity of students. Staff were therefore not overcommitted although several taught courses in other departments. No post-graduate students were yet available. Facilities should be available when the Center for Continuing Education, now under construction, is completed. The Agricultural Education and Extension staff were scheduled to move into this center.

Library reference and textbooks were inadequate.

Crop Science--Although 21 staff were approved for this department, only 13 were presently on campus. Others were studying at various institutions throughout the world. The policy in this department, as in others, was to obtain staff with a PhD degree as soon as economically possible. Approximately 40% of the teaching in the first and second year classes was being done by this division. Nine students were enrolled in the third-year option and several were undertaking MSc- and PhD-level training.

The division is made up of the areas of agronomy, plant breeding, horticulture, plant pathology, entomology, and botany. This variety

of academic discipline requires staff with expertise to teach and conduct research in broad and diverse disciplines. Extension experts were also needed to provide inservice training to the Ministry of Agriculture extension workers. Library holdings were adequate in general.

Field equipment was needed to conduct practicals and research.

Agricultural Engineering and Land Planning--Six staff were assigned to this department. They were teaching courses in the first and second years but had few students in the third year option. Qualified local staff with experience to conduct University teaching and research has continued to be insufficient. The department lacked the buildings, equipment, and basic materials to adequately prepare students for this discipline. Technicians were also in great demand.

A new curriculum had been recently approved for this department and discussions were under way to find ways to upgrade this department and to offer a BSc in Agricultural Engineering. This degree is recommended as a four-year program. Another recommendation is that the first year of such a program be held at the Dar es Salaam campus with the three remaining years at Morogoro.

An evaluation of practical training in this department was difficult. Library textbook and reference material was inadequate and more staff was needed to cover the broad spectrum of disciplines in engineering.

Food Science and Technology--This department was comprised of six staff members, some who had been transferred from the soil science department. Courses were taught in the first and second year class and eight students entered the food science option in January 1979. Facilities were inadequate and staff were using laboratory space and equipment in other departments. The need for trained people in this area, particularly in food processing and Home Economics, could be met by this department if staff, students, and facilities were made available. The department was new, having only started in 1976, and therefore difficult to assess

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Division of Forestry--This division was adequately staffed, had good facilities, and had many staff in training to replace the expatriate personnel. The staff consisted of 10 expatriates. There were about 90 students in the division at the BSc level, 6 students at MSc and 2 doing work at Morogoro toward a PhD. The general policy has been for Tanzanians to do coursework at foreign institutions and complete their research in Tanzania. Students from seven countries were enrolled in this program.

Division of Veterinary Science--The Division of Veterinary Science was started in 1976 with 12 students in the first year of a four-year program. At the time of this study, 9 students were in the fourth year of study, 17 in the third year and 19 in the first year. No second year students were enrolled because of the calendar change in intake from July to January.

Fourteen staff were located in this division with one assistant research fellow and one tutorial assistant.

The entire division was housed in temporary quarters until such time as approved new facilities could be constructed. The students were committed to heavy schedules, using holidays and other periods to participate in practical training. The training appeared to be adequate but because students had not yet graduated, it was difficult to ascertain at this time.

Because the facilities are soon to be in the construction stage, it would be valuable for the Head of this division to visit several colleges of Veterinary Medicine in the United States and Europe.

ISSUES AND RECOMMENDATIONS

The Faculty has made rather remarkable progress in developing curriculum, training staff, and providing for a wide range of degree-granting programs in a comparatively short period of time. The faculty is on the verge of being a very good institution and should compare

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favorably with others throughout East Africa and the world if the development process continues to be thoroughly planned.

Virtually since its inception the faculty has been under considerable pressure to increase student numbers and add departments which provide for the manpower needs of Tanzania. However, the Faculty has reached a critical stage in its development and it should study and correct several problems affecting the educational process.

1. The faculty was found to be facing the dilemma of far too few students. It would appear from a first examination that this should improve the quality of education due to a low student/teacher ratio. The student/teacher ratio in July 1979 was about 4 to 1. Conversely, this low ratio will curtail the number of staff and the amount of expertise located on the campus and will reduce the amount of in-depth teaching and research capabilities which should be provided by a highly trained staff and which is necessary for University level education.

   Staff at the Faculty who were interviewed virtually unanimously agreed that the lack of students is the major obstacle in continuing to build a quality program at the faculty. They discussed several factors which may either singularly or in combination constitute the main reasons for low enrollment, as follows:

   a. The number of Form VI leavers has remained comparatively constant. Some new high school programs have opened but more programs in higher education are vying for these students, especially those with high passes in chemistry, mathematics, physics, botany, zoology, and biology. The manpower pool from Form VI students has therefore been spread over more disciplines and fewer students are available to individual programs.

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b. Recent requirement changes for university entrance provides for those students who previously did not possess high enough Form VI passes and Form IV leavers with specific diploma and/or certificate passes, to also gain admission. These students, known as mature entry, provide a valuable contribution to the educational system through their experience for many years in the field. The number of people presently in this category are limited and will not be available to increase the University or Faculty enrollments. This group of students may provide a larger manpower pool in the future, if the quality of education is improved at the Diploma and Certificate level in the Ministry of Agricultural's Training Institutes.

c. Charges have been leveled at the Faculty that the curriculum is too demanding and that students are expected to be in classes and laboratories during hours which are not conducive to good study habits. While the program at the Faculty is demanding, most staff interviewed expressed a need for students to be in-class as much as possible to adequately fulfill their particular academic obligations. Recommendation: Careful consideration should be given to student loads. A study of the Curriculum should be made to eliminate any unnecessary duplications and overlap from previous training.

d. Staff, Ministry officials, and the Administration of the Faculty spoke of the large number of scholarships available through foreign government assistance. While these are appreciated and are highly sought after by students, most

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staff considered the education at the Faculty to be more relevant to Tanzania's needs, particularly at the BSc degree level. They discussed the possibility of donors, providing scholarships for Tanzanian students to study at the Faculty.

Recommendations: The Faculty and Ministry of Agriculture staff should cooperate fully in deciding upon the number of personnel needed at the graduate and post graduate level. Large numbers of Tanzanians should not be sent to foreign countries for training that is available in Tanzania. Some specialized disciplines not available at the Faculty would be exceptions. Perhaps donors could devise ways to improve the Faculty and offer other kinds of stipends if scholarships for Tanzanians are not possible within Tanzania.

2. The variety of changes made in entrance requirements has brought students to the faculty with varying levels of academic and practical knowledge. This wide degree of capability has created the need for remedial-type courses and programs to help alleviate the differences. Form VI students were being given a ten-week course in practical work and the Diplomates (mature entry) were being given the same time as remedial courses, such as chemistry, physics, biology, etc. This practice, while necessary, also reduces the amount of time which can be devoted to more in-depth training.

   No recommendation is made. The present method of dealing with this situation appears to be adequate.

3. Communications between the Ministry of Agriculture and the Faculty concerning training and manpower needs are sometimes lacking. With closer cooperation the Faculty could more nearly plan for

the manpower needs of the future. Substantially more emphasis was being placed upon the educational qualifications of the policy and decision-making officials within the Ministry. Officials with increased levels of education will be more conversant with problems in higher education. It is important that the faculty be fully informed and conversant with the Ministry's needs and requirements.

Recommendations: Definite liaison should be established between the Division of Manpower, Ministry of Agriculture and the Faculty of Agriculture, Forestry and Veterinary Sciences. This could be brought about by a special individual within the Ministry being assigned this responsibility.

4. Continuity of staff continued to be a major concern in the development of curriculum, in the planning and development of the Faculty, and in the general operation of the institution.

Expatriate staff generally spend short periods of time at the college, creating discontinuity of program and inadequate advising of post-graduate students. It takes time for expatriate staff to become aware of the specific needs in Tanzania. Longer contracts would reduce this problem. More lucrative contracts may be needed.

Tanzanian staff also create the same difficulty. Many staff were being moved from the Ministry of Agriculture to the Faculty and seconded staff may be reassigned to the Ministry. Staff were rightfully being given the opportunity to further their education, thus leaving the faculty and creating the same lack of continuity.

Staff at the Faculty were felt to have less opportunity for government transport and less opportunity to purchase amenities

and obtain living stipends via travel. If they are not dedicated they may prefer to work for the Ministry of Agriculture.

Recommendations: Ensure through salaries, travel stipends or other methods at the disposal of the government, that personnel at the Faculty receive higher or at least equal benefits to those working in the Ministry of Agriculture.

5. The library and its holdings were inadequate for the Faculty, although the number of volumes in many disciplines had been increasing. The new facilities were adequate but increased reference material were needed. The five year development plan requests library materials which should, if implemented, alleviate this situation. Library space at the Faculty appeared to be adequate at the time, but reference books, journals, periodicals, and abstract articles generally did not meet the needs of most departments. During interviews most department heads expressed concern with this aspect of training, specifically as it related to post-graduate research efforts. Future plans for the Faculty included the expansion of these facilities with the possibility of providing for a national agricultural library system. The need for highly trained library staff was expressed by many interviewed as a solution to improving the library situation.

   Recommendation: There is a need to select several Tanzanians to receive library training to service the needs of the Faculty. More outside donors could be solicited to contribute funds for books, periodicals and journals as well as other material relevant to teaching and research activity. If the library is enlarged as planned it should be adequate for the Faculty needs.

6. Practical Training has been discussed and reviewed at most levels of education in Tanzania and people agree that students

should learn to apply the knowledge they receive in a manner which will increase the development of Tanzanian resources. Perhaps nowhere is this more evident than in the field of agriculture which is the basis of the nation's economic system. Self reliance and production as a national policy must be practiced by all citizens to increase the standard of living. People at all levels should be producing goods and fibers to sustain themselves.

Recommendation: The need to integrate the practical training of students as it relates to academics and the goals of self reliance must be given careful planning. The curriculum in most cases appears to consume all of the student's time in both the three-year Bachelor of Science Degree in Agriculture and Forestry Programs and the four-year program in Veterinary Science. Careful study of all possible alternatives is necessary. This may constitute revising the present curriculum and eliminating some of the present material, lengthening the time required to receive a degree, or a combination of these. Another suggestion given during interviews was that an entire year, or other period, might be devoted to practical work after students are accepted into the Faculty and before any formal educational process has started. This work could be done on the Faculty farm which is extensive.

New Departments.

The three newest departments at the Faculty were adding considerably to the wide variety of academic disciplines present in the Faculty of Agriculture. The size of the Faculty at Morogoro of course does not lend itself (it is not large enough either in staff, facilities or students)

to offer in-depth training in all areas which may be desirable. However, the new departments of Food Science and Technology; Agricultural Education and Extension; and Agricultural Engineering and Land Planning had successfully initiated sound programs. While none of them had facilities of their own, laboratories, etc., they were planning for the future with good staff. A wider variety of staff will be needed to meet specific academic needs, particularly in the Agricultural Engineering and Land Planning and the Food Sciences and Technology Departments. The Agricultural Education and Extension Department was presently well staffed and will move into the center for Continuing Education.

Recommendations: Two degree programs which should be discussed and planned for the future are Range Management and Wildlife Studies. These areas are quite important to the economic development of Tanzania. Specific donors might be sought to sponsor these two departments. The scarce resources at the college at present may not provide for adequate facilities, equipment and staff without curtailing growth and activity in other departments.

Student Recreation Facilities.

Outdoor sport facilities were lacking at the Faculty. Only a few acres were devoted to playing fields, tennis and other local and international sports which encourage the development and growth of students physically and mentally. Not a great amount of time should be devoted to these activities; however, teams of various sports promote discipline, cooperation, and physical fitness. Good sports teams encourage pride in the institution, a closer awareness of institutional needs and in the future could increase mass support.

Recommendation: The building of sufficient sports facilities should be encouraged to provide for student and staff needs. The student body should assume the leadership in planning programs and facilities for the Faculty.

Teacher Preparation.

The teaching program at the Faculty appeared to possess the quality necessary for a good program. The teachers seemed to be dedicated, with a few exceptions, and interested in providing the best education possible. This should certainly be encouraged. Many staff, however, lack formal training in teaching methodology and are not adept at organizing class material using visual aids and determining individual student needs. Seventeen of 23 staff surveyed agreed that they should be provided with more information on teaching methodology.

Recommendation: Every opportunity should be promoted to have the Agricultural Education and Extension Department initiate in-service training programs for staff. Activities might include guest lecturers on good teaching methods, audio-visual aid workships, lesson plans preparation, and other programs requested by the staff.

Transportation.

Transportation continues to be a problem. Transport was needed to take students on field trips, to buy supplies and equipment, to operate the farm and to adequately administer the entire resources of the Faculty. Many departments were in short supply of teaching and laboratory equipment including equipment for field practicals and equipment for the general farm operation.

CONCLUSION

The Faculty of Agriculture, Forestry and Veterinary Science was found to be operating a good program in most academic areas. It was difficult to determine the quality of some programs and departments since they had been newly initiated. Students had not graduated, and the staff did not yet have feedback from these academic emphases upon which to base an assessment.

Highly-trained staff in teaching and research had continued to be insufficient, but this was improving as more Tanzanians receive their PhD degrees and elect to remain at the Faculty.

Facilities were improving, new construction was taking place in several departments, and several new structures were in the planning or approved stages. Equipment for these programs will be obtained as the facilities become available. These additions will enhance the capability and prestige of the Faculty.

The Academic curriculum was continually being assessed and changes were taking place as the staff and students determine the necessity to do so. Several departments had initiated improved curricula and others were in the discussion stages. Changes in the curriculum area progress slowly because of the procedure used by the University to gain approval. This procedure should be maintained to allow for careful review of all concerned before dramatic changes are initiated.

The greatest need of the Faculty at the time of the survey was to obtain a larger student intake. New departments and programs along with the more established ones will be curtailed if more students are not somehow made available. The education received by the student was felt by most standards to be good and relevant to the needs of Tanzania. Hopefully educational planners will not allow the lack of students, staff, and facilities to impede the vital role this institution will have in developing the manpower needed in agriculture, forestry and veterinary science.